



FRIDAY, SEPT. 27.

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## Contributions.

## The Hudson River Tunnel.

TO THE EDITOR OF THE RAILROAD GAZETTE:

After perusal of your article on the North River Tunnel [Aug. 30], I am unable to tell whether the tunnel is 24 ft. wide and 22 ft. high or 22 ft. wide and 24 ft. high; or how far the centre of the "pilot" is below the roof; or whether there is an invert of masonry; or whether the steel plates referred to form a permanent interior lining of the tunnel, or occupy a position between the brickwork and the silt, or simply serve as centres and are removed when the arch is keyed. Nor do I understand your statement that the "pilot" projects into the undisturbed silt. How can the "pilot" project into the silt, without disturbing it?

It is related that, on one occasion, a clerk in the Treasurer's office at Washington wrote, with much self-satisfaction, an elaborate letter of description, in answer to some inquirer for information, and took the letter for approval and signature to Mr. Spinner, the then Treasurer. Mr. Spinner read the composition carefully; and then, looking up over his spectacles, said: "Yes, this is all very fine; but what does it mean? Young man, whenever you write a letter, phrase it as if you were addressing a d----d fool."

## ONE OF THE FOOLS.

[It was not our aim to minutely describe the method of building, since that has been frequently and thoroughly done. We merely wished to recall to the minds of our readers the principal features of the work. The excavation measures about 24 ft. in height by 22 ft. in width; the inside measurements of the tunnel are 18 ft. high by 16 ft. wide; the masonry being 30 in. thick. The dimensions of the excavation are apt to vary a little according to the nature of the material passed through. There is no rule fixing the position of the pilot—sometimes its axis coincides with that of the tunnel, and sometimes it may be a little above or below. There is of course a masonry invert. The steel plates form a shell, which is braced as may be necessary by struts resting against the pilot. A cross section then has the appearance of a big and disproportioned wheel having the pilot for a hub, the struts for spokes and the shell of plates for a tire. The shell is between the silt and brickwork, which is laid within the shell.—EDITOR RAILROAD GAZETTE.]

## Transition Curves.

TO THE EDITOR OF THE RAILROAD GAZETTE:

SHANGHAI, July 31, 1889.

In some of your recent issues letters have appeared relating to a subject which crops up from time to time in all engineering periodicals, thus proving that many of our young engineers are still in doubt about it. I allude to the question of the best method of introducing an easing curve on a railroad at the junction of a curve and a straight.

I believe much the easiest and most satisfactory method is as follows: If two straight lines  $A B$ ,  $C B$ , fig. 1, have to be joined by a curve, instead of setting it out so as to touch these lines, set it out so as to touch two auxiliary tangents parallel to these lines. The distance of each of these auxiliaries from the straights should be one-third of the amount by which the particular circular curve to be used diverges from its tangent in a distance of 100 ft. If the curve is a one-degree curve (for chords of 100 ft.) its offset from the tangent in 100 ft. is 1.74 ft., and the auxiliaries should be set out 7 in. from the main straights, and so in proportion, 14 in. for a two-degree curve, 21 in. for a three-degree curve, etc. This is all that has to be remembered, and I need not refer to the formula to be

used when the radius of the curve is given in chains and the chain of 66 ft. is used in setting out, as this method is, I believe, little used in America.

There is, of course, no more difficulty in working from the auxiliary straights than from the main straight. If, instead of joining two straights, it is simply desired that a certain

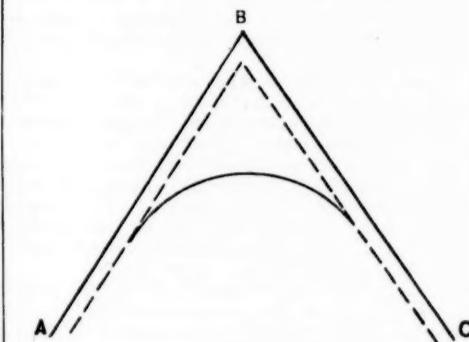


Fig. 1.

curve be started at a certain point, set out the auxiliary as before and start from a point in it opposite the given point on the main straight.

The easing curve is introduced as follows:

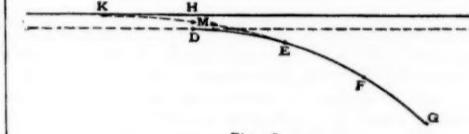


Fig. 2.

$D E F G$ , fig. 2, are stakes in the circular curve, 100 ft. apart.  $H$  is a stake in the main straight opposite  $D$ . The stake  $K$  is in the straight, 100 ft. back from  $D$ . Insert the stake  $M$  half way between  $H$  and  $D$ , and the work is done. The points  $K M E$  are points in a cubic curve, which is tangential to the straight at  $K$ , and to the circular curve at  $E$ . Its radius of curvature at  $K$  is infinite, and the outer rail therefore requires no cant or superelevation at that point, while the necessary cant increases up to the point  $E$ , where it is equal to that required for the circular curve; and as this length is 200 ft., a cant of 6 in. makes the one rail be inclined to the other at an angle of 1 in 400.

It is seldom necessary to give intermediate points, because the plate-layer will always put in an easy curve if he is allowed room to do it, but if intermediate points are required as, for instance, in a tunnel or at a station, where masonry has to be built, they are easily given, as the offset at any point to the curve from the straight (in this case the main straight, not the auxiliary), is proportional to the cube of its distance from the stake  $K$ .

This method is theoretically and practically perfect, and my experience is that it gives no trouble whatever. The method is old, but the original system, by which a different length of easing curve was given to each circular curve, was so complicated that it was but little used.

I must not occupy your space by a general dissertation or setting out, but I may be allowed to remind young members of the profession that if they wish to adopt this or any other system, they must use it in the original setting out. If this is not done, the easing curve cannot be introduced afterward in the case of quick curves, where, of course, it is most wanted. The stakes  $H$  and  $D$  should be preserved as long as possible for reference, and their position in important cases can be marked by driving two stakes in line, one on each side of and clear of the work, and noting the distances from them with a steel tape.

G. JAMES MORRISON

[As Mr. Morrison intimates, this method is old and it must be well known. It has been explained before in the *Railroad Gazette*, once at least, several years ago. It is, however, so simple that it is practically useful and should be familiar.—EDITOR RAILROAD GAZETTE.]

## The Return of Claimants' Bills of Lading.

PHILADELPHIA, Sept. 17, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read your comments upon the claim rules of the Southern Railway and Steamship Association, Aug. 23, and the letter of "Merchant," Aug. 30, and am a little puzzled as to the application of the fable appended by you to the latter.

Had "Merchant's" query been given me to answer, I should have found no difficulty in satisfying him. The reply would have been simply that it is not true, and here I beg leave to disclaim any courtesy. I have no doubt that "Merchant" thinks the facts are as he states, and doubtless some railroad agent has declined to detach his bill of lading or freight bill from the papers of claim temporarily in his care, but if "Merchant" had applied to the General Freight Agent or the Freight Claim Agent for the return of his papers he would certainly have received them. In other words, it is customary with all railroad companies to hold original papers furnished by the claimant as a sacred trust, to be returned upon demand should the claim not be allowed.

You can readily see that it would be improper to authorize any employé to detach and return these documents.

This must be done by or under the orders of the officer in charge of the department of claims.

And now will you kindly say why you think the demand of a railroad company to retain possession of the original bill of lading upon payment of a claim "is simply asking to be humored in clumsy business methods?" A bill of lading is a receipt for the consignment given by the carrier—it should be taken up upon the delivery of the merchandise to the consignee and be filed to show such delivery. If the exigencies of business do not allow of the carriers demanding the surrender of these bills of lading in every instance before delivery, they do not any the less belong to the carriers, the contracts for which they were issued having been performed. When, therefore, they come into the carrier's possession by means of claims for shortage or damage and the claims are allowed, what possible right to them have the claimants? The freight or expense bills, being receipts given by the carrier for freight money received, are altogether different; they undoubtedly belong to the person or firm who paid the money to the railroad company, and I have never refused to return them upon demand, first stamping upon them the number of the claim to which each pertained.

Original invoices also most certainly belong to claimants, and certified copies are always received by railroad companies or the originals returned when noted.

If "Merchant" will take the trouble to bring his case before the Claim Department of the "nameless" railroad company, he will find no difficulty in obtaining what he will admit to be justice.

## CLAIM AGENT.

[We are glad to know that our correspondent, "Merchant," was mistaken, although from the above it is easy to see how the error arose. "Claim Agent" says he returns original papers only on demand. Why only then? If shipper is entitled to these papers they should be returned with the letter declining the claim, and special instructions—if that is the hitch—should be issued by the general claim agent when the order to decline is sent to the subordinate. "A sacred trust" the papers should, of course, be, but why hold at all that which belongs to merchants?

Again, about "clumsy business methods," to which our correspondent refers, we do not quite follow his reasoning. The question of the bill of lading passing title used to be disputed, but now the commercial world is settling down to the theory that the bill of lading passes title to the property only when it expressly states so; that is, when property is consigned "to order." The Trunk Line Association recently adopted resolutions enforcing this distinction. The receipts of the Pennsylvania Railroad read: "Not negotiable unless exchanged for bill of lading to order." If bills of lading are not negotiable, and pass no title, they become mere evidence of receipt and conditions of transportation. As such we do not quite see how the railroad can claim legal rights to them, except for identification of consignees? Does "Claim Agent" hold that common receipts are railroad property, too? In a court of law, the delivery of goods can be proved in a number of ways; and a receipt for the claim money given by the proper party to the claim agent, even if accompanied by no other documents, is perfectly valid. In a great many cases bills of lading and freight bills are demanded by the railroads simply to save themselves trouble lest another claim should be made by a second party; but when it comes to that we doubt the legality of any demands for papers belonging to consignee for any such purpose, or even for the sake of stamping the claim number on them. Long-continued custom and, so far, acquiescence on the part of the shipping public should not blind us to the principles involved, nor should we in consequence take public positions which are really untenable.—EDITOR RAILROAD GAZETTE.]

## Some Novelties in Interlocking.

The business of designing and manufacturing signaling apparatus for railroads has long been attractive enough to lead many people in this country to undertake it, but notwithstanding our great mileage of railroad the profit has been very little. The educational process has been slow and expensive, and even to-day among those railroad officers who can control expenditures there are comparatively few who realize the value of proper signals, completely interlocked, and that such signaling is necessarily expensive. The engineers and operating officers who do know these things are numerous, but they have to fight against a great body of ignorance in getting appropriations for such signals as they can recommend. Nevertheless, signaling makes progress, and the signal manufacturers are not discouraged. The latest company to enter the field is the National Switch & Signal Co. at South Easton, Pa.

This company uses for interlocking the Stevens principle, which has been known for years as simple, durable, easily accessible for repairs or changes, and singularly well adapted to special locking. This last is an important matter. Much ingenuity has been displayed in recent years in minimizing the number of levers and so reducing the first cost of interlocking plants, the cost of maintenance, and the labor of operators. While the demand for these economies is constant, and the stress of competition makes it necessary for

the signal makers to study them carefully, at the same time the demand for complete locking grows also. As knowledge of what interlocking should be extends, both railroad officers and those who design and supply interlocked signals become more exacting of thorough locking. Therefore, to meet these two conditions—economy of material, space and labor, and thoroughness in locking—the art of special or conditional locking has been developed with great ingenuity. As we have said, the Stevens locking lends itself readily to special locking. This principle may be seen applied in a crude way on the machines built by the Long Island Railroad Co., one of which was shown in our issue of Feb. 10, 1888. There it is actuated by the motion of the lever. The same principle simply and elegantly worked out, with preliminary actuation, may be seen in the Johnson machine. The National company has heretofore used the Stevens locking with lever actuation, but is now prepared to build machines with the preliminary movement.

The company controls several special patented appliances of decided merit. One of these is Koyl's parabolic illuminated semaphore. This we illustrated in our issue of Oct. 19, 1888, and since that time it has been described in the *Journal of the Franklin Institute* and other publications and its principle is doubtless well known to our readers. Briefly, this semaphore blade is a longitudinal section of a parabola. A strip of corrugated glass 4 in. wide is placed along the centre line of the blade. In front of the post and in the focus of the parabola is placed the lamp. The upper half of the glass of the lamp is red and the lower half clear. Between these two sections of the glass of the lamp is a small screen. Now when the semaphore is horizontal the red light falls on it, and a beam of red light is seen; when it is lowered to "safety" only the light passing through the clear part of the glass of the lamp strikes it, and a beam of white light is seen. Thus this semaphore gives both a color and a position signal by night. The parabolic form of the blade, of course, concentrates the rays, and they are directed along the track. The slight corrugation of the glass is introduced to disperse the rays sufficiently to cover the field which will be occupied by the cab anywhere within view of the signal. It is quite evident that too great concentration of the rays might make the signal dim in some part of the path of the cab approaching it. We can say from observation that this semaphore is not what the famous and profane Ohio statesman called a "d—d barren ideality," but it is really a very brilliant and striking signal by day or night. It is not only good theory, but it works. There is no question about that; the only objections or doubts that may be brought up are that it is more expensive, heavier and more liable to injury and deterioration in service than the plain semaphore. The greater cost of this signal will probably not usually outweigh its greater efficiency when experience has demonstrated its durability. The inventor is now experimenting to find some reflector to take the place of glass, and if he is successful, as seems very likely, the most obvious objection to this semaphore will at once disappear. Even now we do not say that it is a serious objection. This form has been used very satisfactorily in dwarf semaphores as well as for running signals. Eighty of these semaphores have been erected on the Lehigh Valley and they are now standard on that road.

The National company controls a double-wire compensator recently brought out. It appears to be a very efficient device. It not only compensates for changes of length of the two wires due to changes of temperature, but takes up the stretch of the wires and keeps them always taut. The provision for carrying the signal to danger in case either wire breaks appears to be complete. Orders have been received for 250 of these compensators.

Another specialty of the company is Reif's detector bar which we illustrated in our issue of Nov. 3, 1888. The form shown then was not the best inasmuch as the clip supporting the detector bar and the motion bar extends below the level of the bottom of the rail. As the device is now put in no part of it is below the tops of the ties. This bar is moved by a stroke of  $2\frac{1}{2}$  in. and so little power is required that four bars can easily be operated by one lever. This is done at the South Plainfield tower of the Lehigh Valley with entire satisfaction. Many of these bars were put in use on the Main Line Division of the Philadelphia & Reading some time ago and may be seen there in operation. They have been used in all the recent interlocking work of the Lehigh Valley.

The Palmer torpedo machine is also controlled by the National company. This device is probably well known to most of our readers. It has a magazine, holding five torpedoes, and is so connected to the signal connections that when the signal is put to danger a torpedo is put in position to be exploded by a passing wheel. There is no doubt of the success of the apparatus in actual operation on many roads. The Lehigh Valley road is now putting it in place of derailing switches at the Mahoning interlocking. The National company has just received an order for 600 of the machines for Austria.

Mr. Reif has just perfected a simple and ingenious train order signal. Two blades on one pivot are worked by one lever, so that a red signal can be displayed a certain time, and then lowered to display the green signal. Although this is but just completed the company has orders for 15 sets. The company has an excellent selector, by the use of which several signals can be worked by one lever, the signal cleared depending upon the position of a certain switch. The use of this apparatus is no longer novel. It is one of the ingenious devices for saving levers of which we have spoken before. It is doubtless capable of further application than has yet been made of it. On the whole, the new company has a good mechanical basis for a business, and it is actively in the field.

### Electrically Welded Rails.

A note which appeared lately in the *Railroad Gazette* on the experiment of the Pennsylvania Railroad with 60-ft. rails prompts Prof. Elias E. Ries to send to us a copy of a communication which he has addressed to the *Street Railway Journal*. The communication is a reply to an interview which had already appeared in that journal. We print here such part of it as seems of most interest on the subject of welding rails.

"The objection made during this interview to the method of uniting rail lengths by electric welding, as originally proposed and patented by the writer, seems to have been based upon an error in assuming that in the 'continuous' or electrically welded rails no provision is made for expansion and contraction. As there appears to be considerable uncertainty in the minds of many as to the manner in which this process is carried out, and especially with regard to the provisions made for expansion and contraction, I will endeavor to make this clear.

"The principal features of this system of track construction are familiar to the majority of your readers, an illustrated description of the invention having appeared for the first time in the *Street Railway Journal* for December, 1887, to which reference should be had. Suffice to say here that instead of employing the usual rail joints with their attendant connections, such as fish-plates, bolts, locking devices, etc., the ends of the rails, when in position, are permanently and expeditiously welded together by the passage of a gradually increasing, heating current of electricity through the ends of the rails to be united. In this manner a single, uninterrupted and perfectly smooth rail of any desired length can be made. In order to further increase the strength of the weld, the cross section of the rails is somewhat enlarged at these points during the welding process by the formation of a rib between the head and the flange of the rail, where T or girder rails are employed; or at a corresponding non-obtrusive point or points where flat rails are used. Furthermore, in the case of hardened rails the temper is restored to the welded portions immediately after the welding operation, so as to make it substantially uniform throughout.

"It should now be understood that while these rails are practically continuous, as will become apparent further on, they are by no means *theoretically* so. In all cases, the length of single rail lengths for any given road is determined by the shape and size of the rail and the amount of expansion and contraction, or 'creep,' that the grade and nature of the roadbed and rail fastenings will permit without undue strain. Here it should be stated that the rail fastenings preferably employed by me are of such form as to permit free longitudinal movement of the rails, while at the same time the latter are most effectively guarded against any lateral displacement. On the New York elevated railroads, for example, the length of each rail on the straight portions of the line could readily be 1,000 ft., and on level stretches considerably more than this. For cable and electric railroads, where rails of the girder type are supported at intervals of 4 or 5 ft. upon conduit castings, and where the street pavement interferes somewhat with the freedom of longitudinal creep, a maximum rail length of about 500 ft. would probably be sufficient, while for flat, centre-bearing rails, supported upon sleepers, the length could, on a good roadbed, be considerably increased. Each rail, whatever its length, is rigidly secured at a point midway between its ends, to the roadbed or conduit structure, in such a manner that it can only expand toward or contract from both ends, the centre remaining stationary.

"The coefficient of expansion per unit for steel per degree F. is .0000066. A steel rail 500 ft. in length would, therefore, expand or contract .396 in. for each 10 degree variation in temperature. Allowing a maximum range of temperature of 150 degrees F., we have a total expansion and contraction of 5.94 in., or something less than one-half a foot, to provide for in each length of 500 ft. Now, inasmuch as each 500 ft. length is firmly secured at its centre, the maximum movement at its extremities within the entire range of temperature above stated can never exceed three inches. It must, however, be borne in mind that a change in temperature of 25 degrees, which is about the usual maximum variation occurring within the limits of a day of 24 hours in this latitude, can only produce a movement of one-half an inch at the extremities of each 500 ft. rail section, which, of course, is doubled for the thousand-foot lengths. This small amount of daily creep, assisted as it is by the traffic over the road, is scarcely perceptible, and can be allowed without detriment even in cases where the rails are secured by ordinary spikes.

"It will be apparent that some means are required to compensate for the variations in the rail lengths, and to render the rail surface continuous. This is effected in a very simple manner by means of divided 'expansion joints' of special construction. These comprise a rigid elongated chair provided with a self-cleaning groove to receive and guide the ends of two adjoining rail sections, the extremities of the rails being faced off on opposite sides so as to partially overlap each other. The arrangement is such as to provide for the maximum variation that can take place and yet leave the rail surface of the entire line continuous and unbroken, so that the passage of a car from one rail section to the next cannot be detected. On curves the rails forming the curve are welded together, and form a section by themselves, the fixed portion being at the centre of the curve, and the expansion joints being located on the straight portion of the track a short distance before and beyond the curve respectively. Full provision is also made for removing worn or defective

portions of any rail section and replacing the same with a new rail of corresponding length whenever necessary, and this can be readily accomplished without interruption to traffic by means of a special electrical appliance devised for the purpose.

"The rail-welding process is applicable to old and new roads, and the time occupied in forming the weld joints is comparatively short. The current required for the purpose of effecting the welds may either be supplied by a local apparatus or taken from any suitable electric light circuit, the wires of which extend along the line of way, the current in the latter case being 'transformed' into a heating current at or near the welding clamps. The cost of construction on new lines is much less than the cost of the fish-plates, bolts, nuts, washers, etc., that are dispensed with by it, and the strength of the welded joints is many times greater than that of the joints now in use. When applied to new conduit lines, whether electric or cable, the brackets or yokes are preferably formed with a grooved support, permitting free longitudinal movement of the track rails. In the case of electric railroads, the conduit or overhead electric conductors are likewise welded electrically by the same process. The various details connected with this system, and others not here referred to, have been fully considered and form the subject of several patents and pending applications for letters patent, both in this and other countries."

### Baldwin Locomotive No. 10,000.

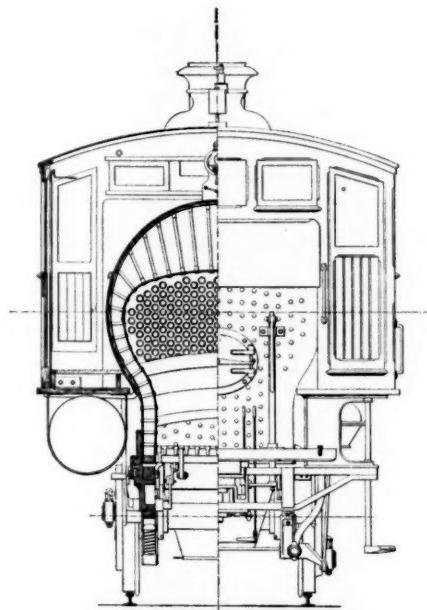
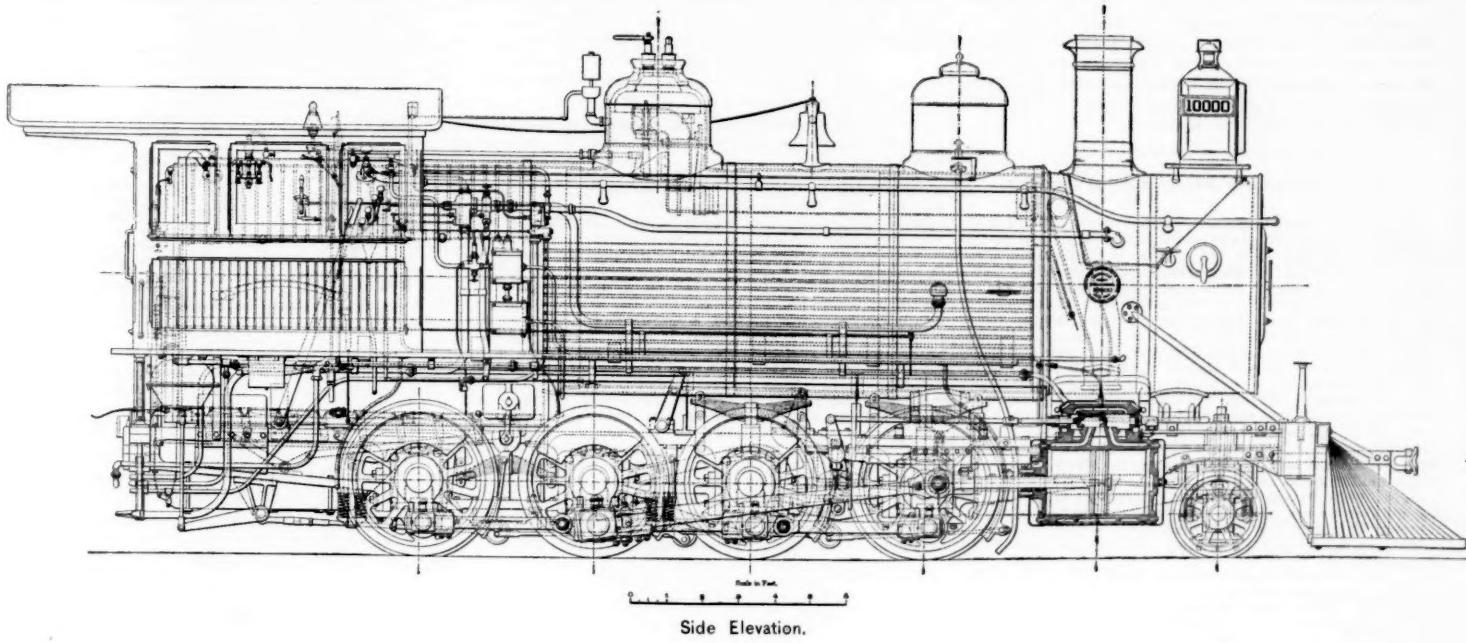
We take great pleasure in placing before our readers some excellent cuts of the ten-thousandth locomotive built by the Baldwin Locomotive Works. Very appropriately this engine is one of the heaviest consolidations. It belongs to the class weighing 75 tons without the tender, with a weight of 135,000 lbs. on the drivers. It is designated as class 10-38-E 32.

The illustrations show very clearly the principal details of the locomotive. The following are the general dimensions:

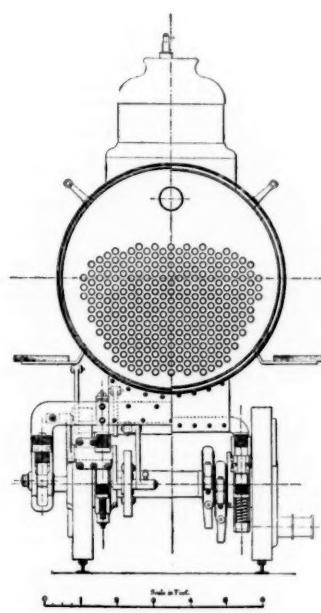
Gauge.....	4 ft. 8½ in.
Actual weight in working order, exclusive of tender.....	150,000 lbs.
Actual weight on driving wheels.....	135,000 lbs.
Estimated weight of tender, including coal and water.....	75,000 lbs.
Estimated weight of locomotive and tender, in working order.....	225,000 lbs.
Cylinders.....	22 × 28 in.
Ports—Length.....	16 in.
" Steam port width.....	1½ in.
" Exhaust port.....	3 in.
Bridge.....	14 in.
Centre to centre of cylinders.....	36 in.
" valves.....	7 in.
Diameter of piston rods.....	4 in.
Throttle—Poppet balance.....	7½ in.
Dry pipe diameter.....	7½ in.
Steam pipe diameter, each.....	6 in.
Lap of valves.....	¾ in.
Valve travel.....	5½ in.
" lead.....	1-10 in.
Eccentric travel.....	5 in.
" diameter.....	16 in.
Length of crosshead.....	20 in.
Driving wheels, four pairs coupled, diam.....	50 in.
Steam pipe diameter.....	3 in.
" thickness.....	6 in.
Tire, plain, width.....	5½ in.
" thickness.....	3 in.
Driving wheel seats, diameter.....	6½ in.
Driving journals, diameter.....	8½ in.
" length.....	7 in.
Driving axle, diameter in middle.....	8½ in.
Engine truck wheel seat, diameter.....	7 in.
" journal, diameter.....	9 in.
" length.....	9 in.
" axle, diameter in middle.....	4½ in.
Total wheel base.....	22 ft. 3 in.
Driving-wheel base.....	14 ft.
Total wheel base of engine and tender.....	49 ft.
From centre of truck to first drivers.....	99 in.
" second drivers to third drivers.....	58 in.
" third drivers to fourth drivers.....	52 in.
Centre to centre frames.....	58 in.
Boiler of steel, ½ in. thick.....	72 in. diam.
Length of barrel.....	19 ft. 7 in.
Diameter of barrel.....	72 in.
Thickness of tube plate.....	3½ in.
Rivets, diameter.....	1 in.
" pitch.....	3½ in.
" style seam.....	Butt.
Height of centre line of boiler above rails.....	7 ft. 8 in.
Fire-box, length.....	10 ft. 1 in.
" width inside.....	42½ in.
" depth.....	62½ × 59½ in.
" material crown thickness.....	¾ in.
" sides and back.....	5½ in.
" tube.....	5½ in.
" stay bolts, diameter.....	½ in.
" centre to centre.....	4½ in.
Tubes, 27 in number, 2½ in. diameter.....	13 ft. 6 in. long
Thickness.....	No. 12 B. W. G.
Smoke stack diameter.....	18 in.
Height from rail to top.....	11 ft. 6 in.
Heating surface of fire box.....	172 sq. ft.
Heating surface of tubes.....	2,121 sq. ft.
Total heating surface.....	2,393 sq. ft.
Tank capacity.....	3,600 gal.
Driver brake.....	Eames equalized.

This engine is one of several of the same class built for the Northern Pacific, where they have been very successfully used on the heavy grades and sharp curves of the mountain sections. A recent report of the performance of one of them states that it has hauled 20 loaded cars, weighing about 600 tons, on grades of 116 ft. and curves of 10 degrees. The total load, including engine and tender, was probably 712½ tons.

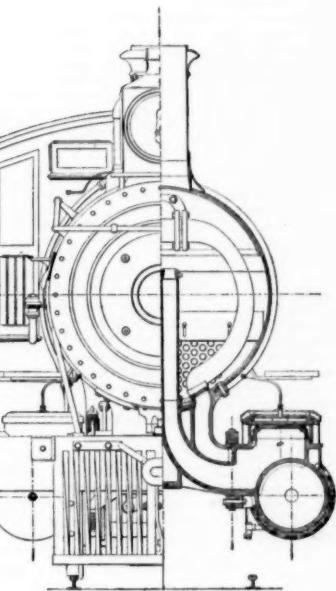
On such heavy grades, the resistance due to unknown factors is a small percentage of the total resistance. In this particular case the resistance due to the grade alone is much larger than all the other resistances, therefore the estimates based upon the conditions are of interest and perhaps of value. The grade is 116 ft. per mile, or about 2.2 per cent. This alone would cause a train resistance of 30,400 lbs. A fair estimate of the frictional resistance is 6 lbs. per ton of total load. This increases the resistance by 4,800 lbs. It will be seen how small is



Half-Section and Rear Elevation.



BALDWIN LOCOMOTIVE NO. 10,000.



Half-Section and Front Elevation.

the frictional or uncertain portion of the total resistance when the grades are heavy. A certain amount of resistance should be added to these because of the 10-degree curve and the 20-car train, and a fair estimate of the total might be safely stated at 37,000 lbs. This calls for an adhesion of the driving wheels to the track equal to 548 lbs. for each ton of weight thereon, and an average pressure on each 22-in. piston of about 148 lbs., including an allowance of 8 per cent. for frictional resistance of the locomotive itself. A draw-bar tension of nearly 33,000 lbs. is enormous, and directly measures the demands made by heavy freight service at the present time, and following in the wake of such demands comes the necessity for an increase of grate and heating surface nearly in proportion. This locomotive, with about 36 sq. ft. of grate surface and 2,393 sq. ft. of heating surface, of which 173 sq. ft. is fire-box surface, bears out the proportions common to the better class of smaller locomotives.

This engine gives evidence, better perhaps than almost any other or previous design, of the change in the opinions of railroad engineers regarding the maximum weight per wheel permissible for locomotive engines. Although this locomotive is of the consolidation type, yet it is not strictly the result of the growth of that type, and can hardly be said to represent the development of the original plan of the consolidation engine. It is really a modification of the decapod plan, and the name "octapod" has been suggested therefor by the builders. The details of the engine resemble the consolidation type, but the work for which the locomotive is intended is that for which the decapod type was originally built. When the decapod was first conceived the maximum weight per single driver permissible was such that it required 10 pairs of drivers to carry sufficient weight to do the work required. Since that time the increase in the allowable weight per single driver has been so much that one pair of drivers has been dropped, the result being the design illustrated by No. 10,000.

This locomotive weighs on eight drivers 135,000 lbs., or 16,870 lbs. per driver. If the weight carried on four drivers on some fast passenger locomotives, that is, 68,000 to 74,000 lbs., is not detrimental to the track, and if such heavy

weights per wheel are, as it would seem, growing in favor, then, except for the effect of the massing of great weights on bridges, there is little reason why such locomotives as No. 10,000, running at slower speeds, should not carry 136,000 to 148,000 lbs. on eight wheels, and perhaps even more if the few express locomotives now running with 19,000 lbs. per wheel are not found to be destructive to the permanent way. Regarding the massing of heavy weights upon bridges, there are several reasons which it is needless to mention here why a slow-running freight locomotive even with a large weight per running foot would not damage or strain a given bridge as much as high-speed locomotive of less weight per foot of wheel base.

The type of locomotive represented by No. 10,000 is intermediate between the average consolidation and the decapod, and the builders feel that, owing to the recent great increase in the maximum weight per wheel, the decapod is a little ahead of the times, believing, as they do, and as nearly every one else seems to, that the same weight carried on eight wheels will furnish as much adhesion as if carried upon 10 wheels and perhaps more traction on the draw bar—which is a measure of the useful work—in proportion to the power generated in the cylinder, because of the additional friction of the fifth pair of rods and wheels. The Philadelphia & Reading, when considering the adoption of a heavy class of freight engines, hesitated between the decapod and this class of consolidations, until the experience with the heavy 8-wheel express locomotives showed that the increased weight per driver was admissible on their permanent way.

There is one point in favor of the consolidation which will, as well as the increase in maximum weight per driver put off the day when the decapod will be the more favored type. It is the greater flexibility of the wheel base of the consolidation. This is a point of no small advantage on the mountain roads, where these types of engines are most needed.

It may be interesting to give here the origin of the term "consolidation" as applied to locomotives. It had its birth in the consolidation of the Lehigh Valley and the Mahanoy railroads, about the year 1866. At that time a locomotive with 10 wheels, 8 of which were

drivers, was building at the Baldwin Works for the Mahanoy Railroad, and as this locomotive was to become the property of the consolidated roads, it was thought apropos to christen it the "Consolidation," it being the fashion in those days in the Middle States, as it is now in some parts of New England, to give to locomotives names suggestive of either great size, power or speed. It was thus that the first consolidation appeared as a 20-in. x 24-in. locomotive, weighing 90,000 lbs., while to-day the consolidation is generally built with the same cylinders, but weighing about 130,000 lbs. The first of the type had a wagon-top boiler, 50 in. in diameter, with a fire box down between the frames, and, therefore, of necessarily small dimensions. Now the same type has 56-in. to 60-in. straight boilers, with the fire box on top of the frames, and much greater dimensions are thereby permitted.

It is suggestive that the weight upon the drivers of the consolidation type has been increased about 50 per cent., and, therefore, its working capacity, and yet the cylinders remain the same, while the steam pressure has been increased but about 15 per cent. It indicates what has before been discussed in the *Railroad Gazette*, that there has been a large increase in the work demanded from locomotive cylinders of late years without a corresponding increase in dimensions. That this has been productive of greater economy there can be no doubt, but we cannot go much further without turning the corner and meeting loss instead of increased gain. When it was discovered that the heavier locomotives worked with even better economy than the lighter ones with the same cylinder, there was a general feeling of relief, and the acquired knowledge was most welcome because it solved the problem of the production of more powerful motors without material changes in the working part. About the time that these charges were being made the stationary steam engineer discovered that it was not economical to use the early cut-offs in a steam cylinder and that, at a 22 to 25 per cent. cut off, steam engines were more economical than at 10 and 15 per cent. cut off. This knowledge gave to the locomotive builder increased confidence in the step taken in increasing the demand from

locomotives without increasing the cylinder capacity, thus necessitating a longer cut off. The two most probable reasons for the increased economy of the heavier engines lies in the nearer approach in the average working, to the most economical cut off and the reduction of the loss of steam caused by the slipping of the drivers.

#### The Roadmasters' Association of America.

We gave last week abstracts of the papers on rail joints presented at the Denver convention of this organization, and also some other report of the results of the meeting. The committee on rail joints made a report, recommending that a plate of iron or steel be used, extending across two ties, or three ties, to be used with a steel angle bar. The papers of Mr. Burnett and Mr. Delano, printed in abstract last week, formed a part of the discussion on this subject. In the discussion Mr. Courtney (Lake Shore & Michigan Southern) wished that the question of the use of the plate should be investigated before the Association committed itself to such a recommendation. His road had tried a bottom plate 26 in. long, but, instead of it, had adopted a 3-tie angle splice.

Mr. W. F. ELLIS (Providence & Worcester) could not endorse the report of the committee. He had tried the Fisher joint and did not approve of it. Hence he was not prepared to try another plate under the rail.

Mr. ROBERT BLACK (Manhattan Elevated) said that he had used the Fisher joint for three years, with perfect satisfaction. It is standard on his road.

Mr. JOSEPH KINDELAN (Chicago, Milwaukee & St. Paul) agreed with Mr. Courtney as to the efficiency of the long angle bar. It had been in use on his road for three years. He had never seen one broken.

Mr. J. R. PATCH (Connecticut River) uses a 24 in. angle bar weighing 38 lbs. to the pair. He has had them in use on 66 and 72-lb. rails on 30 miles of road. Began using them five years ago; has never had a broken joint since the use of this angle splice, and has no trouble in keeping the joints up. His joint is suspended.

Mr. BISHOP (Pittsburgh) spoke in favor of the Fisher joint, with which he has had large experience. It is used on his road in many miles of track, and has been for a number of years. He looks upon it as the standard joint. The chief engineer of the road had informed him a short time ago that nine-tenths of the broken rails are through bolt holes of the angle splice joints; the other tenth was with the Fisher joints. In surfacing he finds more low centres than low joints, and considers the joints the easiest part of the road to keep in surface.

The question of joints was referred back to the committee for further consideration and a subsequent report.

At the session of Wednesday afternoon the Committee on Standard Joints returned its report with no other change than one providing for the use of a plate across three ties instead of limiting it to two. The committee could see no further practicable change to be made in its report. President Craig offered a resolution that the majority report presented at the Washington meeting be substituted for the report of the present committee, except that no form of nut-loc be shown. In supporting his resolution he said that he thought that the members of the association were agreed that the three-joint tie must be closely spaced; and, further, that a plate under the joint was expensive and that it will shorten the life of a rail by offering an anvil to receive the blows of the wheel. The three-tie joint has already been widely adopted.

Mr. Courtney (L. S. & M. S.) offered an amendment to Mr. Craig's resolution, to the effect that the long angle bar extending over three ties, supported, makes the best joint known; the angle-bar to be of sufficient weight, the length to be from 36 to 48 in., this length governed by the practice of the road in the number of ties used per mile, the ties to be spaced the same at joints as elsewhere; the angle splices to be fastened with from 4 to 6 bolts, slotted for spikes at the ends; the splices to be made of steel. Mr. Craig accepted Mr. Courtney's amendment and the resolution as amended was carried.

The report of the Committee on Labor on Track was presented as follows, and was adopted by the Association:

To begin with, we divide the different roads into three classes:

1. Roads with heavy tonnage and fast trains.
2. Roads with moderate tonnage and fast trains.
3. Roads with light tonnage.

The objects of a roadmaster are:

1. To render the road as safe for the purpose of traffic as the attending conditions allow.
2. To bring up to and maintain it in as high a standard of excellence as possible.
3. To carry out the two preceding conditions as at little expense as would be consistent with safety and economy.

All roads should be divided into sections, each section to be under control of a section foreman. All extra work, such as laying new rails, ballasting, putting new tracks and switches, building new fences, etc., should be done with extra men. The following table will give the kind of ballast, length of sections, and average number of men required under the varying conditions, as recommended by your committee:

#### SINGLE TRACK, FIRST CLASS.

Kind of Ballast.	Length of Sec.	Average No. Men.
Gravel, sand or cinders.....	5 miles	5
Stone.....	5 "	7
Loam.....	5 "	5

#### DOUBLE TRACK, FIRST CLASS.

Kind of Ballast.	Length of Sec.	Average No. Men.
Gravel, sand or cinders.....	4 miles	6
Stone.....	4 "	8
Loam.....	4 "	6

#### SINGLE TRACK, SECOND CLASS.

Kind of Ballast.	Length of Sec.	Average No. Men.
Gravel, sand or cinders.....	5 miles	4
Stone.....	5 "	6
Loam.....	5 "	4

#### DOUBLE TRACK, SECOND CLASS.

Kind of Ballast.	Length of Sec.	Average No. Men.
Gravel, sand or cinders.....	4 miles	5
Stone.....	4 "	7
Loam.....	4 "	5

#### SINGLE TRACK, THIRD CLASS.

Kind of Ballast.	Length of Sec.	Average No. Men.
Gravel, sand or cinders.....	6 miles	4
Stone.....	6 "	6
Loam.....	6 "	4

The above number of men should be distributed during the different seasons of the year, as the climate and circumstances allow.

We are of the opinion that it is absolutely impossible, having regard to the number of men allowed, to keep roads bal-

anced with loam in as good condition the year around as roads ballasted with gravel, sand, cinders or stone.

O. F. JORDAN, M. C. R. R.,  
J. R. PATCH, Conn. River,  
C. E. JONES, C. B. & Q.,  
W. J. MCINARNA, N. Y., P. & O., Committee.

Mr. Robert Black (Manhattan Elevated), Chairman of the Committee on Automatic Switch-stands, read the following report:

The subject of automatic switch-stands is one involving more of a history than your committee had at first supposed possible. We find that automatic stands were invented and patented in Germany as far back as 1852 and 1853. \* \* \* The object was and is to devise a means of throwing a switch which, in the event of inattention on the part of switchmen or brakemen, would protect an approaching train and so save the road the expense incurred by a wreck more or less severe, and from possible loss of life. The next step taken to attain this result was putting a spring either between the points of a switch, as in what is known as the "Lorenz" switch, or by attaching it to the moving rod, having the spring intervene between the stand and head-rod of the switch. The objections to these devices are so generally recognized that it is unnecessary to refer to them here. Suffice it to say that where a spring intervenes between the points of a switch and a target, indicating the position of those points, the conditions are unsafe. The connection between the points and target should be positive and allow no lost motion, and it should be impossible to throw and lock a switch-stand long as an obstacle of any nature remains between the point and the main rail. Thus these devices did not solve the problem. \* \* \* We learn that there are at least ten automatic switch-stands now claiming public attention.

Your committee, realizing the importance of getting as wide an expression of opinion as possible concerning these different stands, under the different conditions existing in remote parts of the country, have made inquiries east, west and south on this subject, and after gathering such information have come to the conclusion that that pattern of automatic stand now in use on most of the railroads in New England, some time since adopted by the railroads of the Atlantic seaboard in the South, and recently adopted by most of the principal railroads of the Northwest, is best adapted in all respects to solve the problem presented to us.

R. BLACK,  
G. E. CAIN,  
W. H. STEARNS, Committee.

The committee further recommended that a detector bar be used for the purpose of preventing trainmen and others, while manipulating the switch, from throwing it between the trucks of a car, and that the detector bar, lock and signal all be thrown by one lever and in one moment.

Your committee would further recommend that when switches are moved with a 3½ or a 4-in. movement, a short guard rail be used in front of the point and close to its end on the side leading into the siding, to protect a loose wheel from taking the outside of the point while passing on the main track.

To obviate the use of the guard rail, and thus lessen the liability of injury to trainmen from being caught while in the performance of their duties, your committee would further recommend that the throw of a split switch should not be less than five inches.

In the discussion of this subject Mr. Black said that the committee concluded that the automatic switch-stand most in use, and that which gave the best satisfaction, was the Ramapo. The report of the committee was adopted, after an amendment substituting two guard rails in front of the points for one, as recommended by the committee.

The report of the Committee on Standard Frogs was then read, and adopted by the convention. The substance of the report is the following:

That we concur in the recommendations of the Superintendents' Association in the following points, viz.:

As to the durability of the spring frog over the stiff rail, and in preference to the riveted frog over any other pattern that we now know of.

In the recommendation of sufficient width of heel to admit splices without any or the least possible cutting.

In the length for distance, from heel to point, excepting Nos. 9 and 12.

To prevent frogs of a different angle, being of the same length, we would recommend No. 9, 8½ ft. instead of 8, and No. 12, 10½ ft. instead of 10 ft.

In that the guard rail distance, or width of channel, or throat of frog be not less than 1½ in. nor more than 2 in., and in that the gauge should be exact at all points of the frog, except where the point is beveled.

P. NOLAN,  
R. CAFFREY,  
T. HICKIEY,  
O. F. JORDAN,  
J. H. PRESTON,  
A. B. ADAMS,  
C. H. CORNELL, Committee.

Mr. John Doyle, chairman, read the report of the Committee on Cattle Guards and Crossings. It was to the effect that the ordinary open or pit cattle guard, which is almost universally used, is a constant source of danger; that nothing has been found to take its place but the surface guard. The committee considered the iron surface guard, which has already been placed on 70 or 80 roads, as the best and safest one used, and for the reasons that it does away with the opening in the track and will turn cattle off the track as effectually as the open guard; it costs less than the pit guard and is no more trouble; it is easily removed for purposes of repairs, and does away with the trouble of the heaving of guards by frost. The report was unanimously adopted.

The report of the Committee on Road Crossings was also unanimously adopted. This was, in effect, that the flange-way should be 2½ in., planked the height of the rail, with a guard rail inside of each main rail, the space between to be filled with broken stone, gravel or other ballast.

Mr. J. H. Preston (C. R. I. & P.) read a long address on the organization of the Association with reference to its usefulness to the railroads and employees. He suggested the advisability of organizing state or district associations, to be junior to the general association, these to be represented, perhaps, at the annual meetings by delegates. A committee was appointed to consider Mr. Preston's suggestion, but the committee did not feel that it had time to report upon the matters.

The president introduced the subject of the relation of the Association to other railroad associations, and the secretary read the remarks of various members of the Superintendent's Association upon this subject.

The chairman of the Committee on Tools made a report, specifying a list of tools for a section of five miles with a force of five men and foremen, as follows. This report was adopted.

2 adzes.  
1 axe.  
1 hand adze.  
1 box, tools.  
1 bucket, water.  
3 brooms.  
2 bars, claw.  
5 " lining.  
1 " raising.

2 flags, red.  
2 gauges, track.  
1 grindstone.  
3 grub-hoe or mattock.  
6 handles, pick.  
1 " axe.  
2 " adze.  
6 " hammers.  
4 hammers, spike.

6 "	tamping.	1 "	sledge.
12 chisels.	1 hatchet.	1 "	napping.
1 car, hand.	2 lanterns, white.	2 "	red.
1 " push.	1 " globes white.	1 "	red.
3 cans oil.	1 " water.	6 shovels.	6 scythes.
1 " water.	2 boards.	6 "	snaths.
2 chains.	6 picks, clay.	6 "	stones.
2 dippers.	6 " tamping.	6 "	torpedoes.
1 drill, ratchet.	1 punch.	1 track jack.	1 tape line.
1 level, track.	2 padlocks.	1 track lever.	2 wheelbarrows.
2 " boards.	1 saw, hand.	4 wrenches, track.	1 crosscut.
6 " blocks.	1 " crosscut.	1 monkey.	1 water keg.
6 shovels.	1 rail saw for every fifty miles, and 1 " Jim Crow" for every fifty miles.		

JAS. SLOAN,  
J. A. KERWIN,  
JNO. DOYLE,  
JNO. SCOFIELD,  
JNO. R. RAMSEY,  
W. F. ELLIS, Committee.

The members of the convention were asked to inspect the Ionia steam hand-car, the Leslie rotary snow-plow and the pneumatic crossing gate, which were exhibited in operation. There was a fine exhibit of the material and appliances which are customarily seen at the conventions, with few novelties.

A long and very interesting excursion was taken to Graymount, Lendville, Pueblo, Colorado Springs and Manitou, the party visiting many places of interest en route.

#### The Goldie Spike.

The spike which we illustrate is the design of Mr. William Goldie and is manufactured by Dilworth, Porter & Co., of Pittsburgh. The purpose of the designer was to make a cutting point which would drive without displacing the fibres of the tie. It will be seen that the spike has two cutting edges and is so shaped that the head is drawn toward the flange of the rail in driving.

This spike is made in the usual way and then the surplus metal is sheared off diagonally by means of a special machine patented by Mr. Goldie, which consists of a reciprocating die of V form, the spike resting on a stationary die, which supports it while being cut. It is sheared cold. The patents cover the form of point, the machine, and the process for forming the spike in this peculiar manner. Being cut cold, the iron comes out with a clean cutting edge.

In point of economy the cost of the spike is actually but little more per ton than the common spike, as it runs about 3 per cent. more spikes by count to the ton, and all of the spikes are perfect, and it is said to be a fact shown by experience that they can be driven in about half the time taken to drive the common spike.

The result of this form of spike is not only that it drives more easily and without turning, but that, owing to the less injury to the fibre of the wood, it has greater holding power than the ordinary spike. This is particularly noticeable in



ties of soft or semi-soft timber. The following actual tests were made to determine the relative holding power of this and the ordinary spike:

Kind of spike.	Kind of timber in tie.	Average No. of lbs. No. of tests.
Common 5½ × 9-16.....	White cedar, half seasoned.	5 920
5½ × 9-16 with common point.....	" " "	5 1,380
Common 5½ × 9-16 with Goldie point.....	White oak.	5 4,160
Penn. R. standard 5½ × 9-16 common point.....	" " "	5 4,390
Penn. R. standard 5½ × 9-16 Goldie point.....	White cedar.	2 1,520
Penn. R. standard 5½ × 9-16 common point.....	" " "	2 2,640
Penn. R. standard 5½ × 9-16 Goldie point.....	White oak.	2 5,120
Penn. R. standard 5½ × 9-16 common point.....	" " "	2 5,480

The timber used was the best of its kind, and the spikes were also. The fine, long-tapered point of the Pennsylvania standard gives it an advantage over the short-tapered common spike for the first start or pull; at a second pull, after it has been started about ½ in., it loses this, owing to the tapered portion in the tie having lost its bearing.

Dilworth, Porter & Co. have been making the Goldie spike for the last four months and are running four machines, making eight tons per day, and ready sale is found for the whole product. One road already has ordered about 180 tons of them. A number of roads have ordered all the way from 1 kg to 450 kegs.

#### Brake Shoes and Tire Wear.

It will be remembered that the Master Mechanics' Committee on Driver Brakes, Messrs. Charles Blackwell, H. D. Gordon and W. H. Thomas, in their report at the Niagara Falls Convention, recommended the principle of the Ross shoe. That report was printed in our issue of June 21 last. In the published report of the convention now appears a table supplied by the Philadelphia, Wilmington & Baltimore Railroad, which was not available at the convention. We therefore print it here and also reprint that part of the committee's report which bears especially on this subject.

" Your committee unhesitatingly recommend the principle of the Ross shoe, but are not prepared to state conclusively

until more exhaustive trials have been made, if the cast steel, the Meehan, the Lappin or the Congdon make of the Ross shoe will, all things considered, give the best results. Some shoes, while possessing great endurance, are charged with excessive wear of the tires. This feature may be overcome by modification in the composition and treatment of the metals and in making the shoes, but probably at their expense. The excellent tire-dressing results obtained by using the 'Ross-Meehan' and the 'Ross steel shoes' are worthy of attention. Your committee regret that they have been unable to obtain information which would enable them to illustrate the comparative wear, under similar conditions, of the various makes of brake shoes above referred to, and of the tires to which they were applied. Neither have they been able to produce figures giving the measure of braking power possessed, under similar conditions, by shoes made of various materials. In some cases the 'Ross steel' and the 'Ross-Meehan' shoes are reported as outwearing eight to ten ordinary cast-iron shoes of similar pattern; and in other cases as increasing the mileage of tires between the turnings, from 200 to 500 per cent., as compared with the old style of shoe, bearing on the tread of wheel only. The P. W. & B. R. R., on this point, report as follows:

"The greatest improvement we have ever had in the way of driver brakes is the Ross steel shoe. Since we have commenced to use this kind of shoe, we can get from two to as many as five times more mileage from our tires between turnings, thus saving the cost of the latter, as well as the loss of service of engines while work is being done. It has completely removed the annoyance of being compelled to remove from service engines that are in good condition, excepting that the tires must be turned. Formerly, in nine cases out of ten, it was the bad condition of tires that stopped an engine. Now it is not uncommon to shop an engine for quite extensive repairs, and not turn tires at all."

These advantages are obvious, and when more generally understood will tend to break down prejudice against the use of driver brakes, and consequently to increase the proportion of engines so equipped. A tabular statement, supplied by the P. W. & B. R. R., and showing mileage made between turnings and per  $\frac{1}{2}$  in. of wear of tires, in the case of seven different engines, fully illustrates the advantage of using the 'Ross steel' shoe as compared with wrought-iron shoes of the ordinary narrow pattern."

It will be noticed that the greatest gain from the Ross shoe is found where the service is most severe. In the two cases where the engines were running in local passenger service on hilly and crooked road, the advantage from the Ross shoe was very much greater than in the other cases, although in these the gain was from 73 to 175 per cent.

#### Western Railway Club.

The first regular meeting of the season was held Sept. 17, Vice-President Barr in the chair. The following officers were elected for the coming year: President, Mr. John Hickey, Milwaukee, Lake Shore & Western; First Vice-President, Mr. J. N. Barr, Chicago, Milwaukee & St. Paul; Second Vice-President, Mr. C. A. Schroyer, Chicago & Northwestern; Treasurer, Mr. Allen Cooke, Chicago & Eastern Indiana; Secretary, Mr. W. D. Crosman, *Railway Review*.

The following resolution, proposed by Mr. Sargent, was carried unanimously:

*Resolved*, That in appreciation of the efficient and faithful manner in which Mr. Godfrey W. Rhoades has performed his duties as President of this club, we do hereby extend to him our heartfelt and sincere thanks.

A similar resolution, extending the thanks of the club to Mr. W. B. Snow, past Treasurer, was carried.

The Secretary then read the following paper by W. H. Marshall, of the *Railway Review*:

#### EXHAUST PIPES, NOZZLES AND STEAM PASSAGES

It will doubtless be agreed that to conduct steam from the boiler to the cylinder with the least possible loss of pressure and a minimum of condensation the passages should have ample area, should be straight and should be well protected from losses due to radiation of heat from them. To make the passages perfectly straight is evidently impossible, but we should not lose sight of the fact that every abrupt bend is detrimental and care should accordingly be taken that the path of the steam is not unnecessarily crooked. The area of the passage is not, generally speaking, limited by any features of the design of the locomotive, but may be made as great as necessary. This, however, has not been done in very many cases. It is by no means unusual to find 16, 17, 18 and even 19 in. cylinders supplied with the same sized throttle, dry pipe and branch pipes, regardless of whether they are switching, freight or fast passenger engines, and often these passages are none too large for a 16 or 17 in. engine.

When we investigate the size and shape of the live steam passages cored through the cylinder saddle from the base of the branch pipe to the steam chest, we often find a far worse state of affairs, for not only are these passages decidedly crooked, but they are also very much contracted in places. One of the most common ways of coring these passages is that in which the passage beginning with the same area as the end of the branch pipe is divided into two branches, one coming up into the steam chest at each end of the valve seat. Unless great care is taken, these branches will be too small. It is not sufficient that the combined areas of the two branches should equal that of the passage before division took place, for the balanced valves of to-day obstruct the movement of steam from one end of the steam chest to the other, and though this has been partly remedied by the passages usually provided through the steam chest cover, it is, nevertheless, advisable to have each branch of the live steam passage nearly equal in area to the main passage. And yet if some of these could be examined their form and variation in area would be apt to suggest a badly-kinked garden hose. Points in the passage would be found to be reduced 25 per cent. from the average, and indicator diagrams might show that we are unable to obtain boiler pressure in the cylinder and that steam does not follow the piston properly. May not some of the trouble be due to these ill-designed passages?

The necessity for all these precautions lies in the fact that the time for admission to the cylinders at high speed is so short. If the cylinder heads were removed and the throttle opened and steam blown through these same passages, the boiler would soon be empty, but while under such conditions it is found they are able to pass all the steam which the boiler could possibly generate, it does not follow that they are sufficiently large to guarantee an initial pressure in the cylinder equal to boiler pressure when running at high speed. The fact that the ports are open only part of the time entirely changes the conditions and makes it imperative that the area should be ample, especially where entering the chest, as at these points the original single passage of the dry pipe has been divided into four, each of these four being the most direct path of the steam to some one of the four steam ports. The flow through the dry pipe will be practically continuous, but in each one of the pas-

TABLE SHOWING COMPARATIVE MILEAGE OF DRIVING TIRES FURNISHED WITH PLAIN WROUGHT-IRON SHOES AND ROSS STEEL SHOES: REPORTED BY THE PHILADELPHIA, WILMINGTON & BALTIMORE R. R. TO COMMITTEE OF THE MASTER MECHANICS' ASSOCIATION.

Engine No. 204, built by P. W. & B. R. R. Co.; 62 in. wheels; 16  $\times$  24 in. cylinders; weight on drivers, 44,400 lbs.; service, local passenger.

DATE OF TURNING.	Thickness after turning.	Mileage between turnings.	Time between turnings.	Mileage per 1-32 in. wear.	Remarks.
May 21, 1884 (new).....	3 in.				
Dec. 3, 1885.....	2 10-32 in.	30782	18 mos.	1399	Plain wrought shoes.
Dec. 27, 1887.....	1 24-32 in.	35101	25 mos.	3061	Ross steel shoes. Applied June, 1886.
May 1, 1889.....	1 15-32 in.	32966	17 mos.	3063	Ross steel shoes. Tires still in service and in good condition.

Engine No. 77, built by Baldwin Locomotive Works; 68 in. wheels; 17  $\times$  24 in. cylinders; weight on drivers, 50,400 lbs.; service, through and local passenger and freight.

DATE OF TURNING.	Thickness after turning.	Mileage between turnings.	Time between turnings.	Mileage per 1-32 in. wear.	Remarks.
July 31, 1882 (new).....	3 2 32 in.				
June 18, 1883.....	2 28-32 in.	23135	11 1/2 mos.	1356	Plain wrought shoes.
Dec. 12, 1884.....	2 12-32 in.	72436	18 mos.	4527	" " "
April 18, 1886.....	1 26-32 in.	72323	16 mos.	4018	Ross steel shoes. Applied December, 1886.
April 1, 1889.....	1 10-32 in.	119628	37 mos.	7477	Engine shopped for general repairs April, 1889. Tires in good condition, but too thin for further service.

Engine No. 218, built by Baldwin Locomotive Works; 62 in. wheels; 16  $\times$  24 in. cylinders; weight on drivers, 41,900 lbs.; service, local passenger, with frequent stops; road hilly and crooked.

DATE OF TURNING.	Thickness after turning.	Mileage between turnings.	Time between turnings.	Mileage per 1-32 in. wear.	Remarks.
Feb. 13, 1885 (new).....	3 in.				
June 30, 1886.....	2 6-32 in.	47728	16 1/2 mos.	1836	Plain wrought shoes.
April 1, 1889.....	1 29-32 in.	96987	30 mos.	10776	Ross steel shoes used. Tires will true up to thickness given and are still running in good condition.

Engine No. 85, P. R. R. standard, class "O"; 62 in. wheels; 18  $\times$  24 in. cylinders; weight on drivers, 58,300 lbs.; service, local passenger and freight.

DATE OF TURNING.	Thickness after turning.	Mileage between turnings.	Time between turnings.	Mileage per 1-32 in. wear.	Remarks.
July 1, 1884 (new).....	3 in.				
June 6, 1885.....	2 11-32 in.	24794	11 mos.	1377	Plain wrought shoes.
Feb. 18, 1886.....	1 28-32 in.	28849	8 1/2 mos.	1603	" " "
Nov. 26, 1887 (removed) .....	1 14-32 in.	58942	21 mos.	4210	Ross steel shoes.
May 20, 1889 .....	3 in.				" " " Tires in good condition, but engine shopped for general repairs.

Engine No. 208, built by Baldwin Locomotive Works; 62 in. wheels; 17  $\times$  24 in. cylinders; weight on drivers, 52,000 lbs.; service, local passenger and freight.

DATE OF TURNING.	Thickness after turning.	Mileage between turnings.	Time between turnings.	Mileage per 1-32 in. wear.	Remarks.
June 9, 1884 (new).....	3 2-32 in.				
Feb. 13, 1885.....	2 8-32 in.	20934	8 mos.	805	Plain wrought shoes.
April 17, 1886.....	1 25-32 in.	39710	14 mos.	2836	" " "
Jan. 10, 1889 (removed) .....	1 4-32 in.	88723	33 mos.	4033	Ross steel shoes. Applied in June, 1886.

Engine No. 216, built by Baldwin Locomotive Works; 62 in. wheels; 17  $\times$  24 in. cylinders; weight on drivers, 52,000 lbs.; service, local passenger; road very hilly and crooked.

DATE OF TURNING.	Thickness after turning.	Mileage between turnings.	Time between turnings.	Mileage per 1-32 in. wear.	Remarks.
June 30, 1884 (new).....	3 in.				
Feb. 26, 1885.....	2 8-32 in.	13252	8 mos.	552	Plain wrought shoes.
April 23, 1886 (worn out and removed) .....	1 14-32 in.	40962	14 mos.	1575.5	" " "
April 23, 1886 (new) .....	3 in.				Ross steel shoes. Applied June, 1886. Engine still in service April 1, 1889, and tires in good condition.
April 1, 1889 .....	2 24-32 in.	123295	35 mos.	15412	

Engine No. 88, P. R. R. Standard, Class "C"; 62 in. wheels; 17  $\times$  24 in. cylinders; weight on drivers, 51,250 lbs.; service, local passenger and freight.

DATE OF TURNING.	Thickness after turning.	Mileage between turnings.	Time between turnings.	Mileage per 1-32 in. wear.	Remarks.
Jan. 30, 1884 (new).....	3 6-32 in.				
Dec. 20, 1884.....	2 16-32 in.	27919	11 mos.	1289	Plain wrought shoes.
Aug. 29, 1885.....	2 2-32 in.	22671	8 1/2 mos.	1619	" " "
May 3, 1886.....	1 16-32 in.	21868	8 mos.	1215	Ross steel shoes. Put on July, 1886.
March 10, 1887 (removed) .....	1 7-32 in.	28404	11 mos.	3156	
March 10, 1887 (new) .....	3 in.				
March 18, 1889.....	2 10-32 in.	58552	21 mos.	2651	Ross steel shoes.

sages entering the steam chest it is more intermittent in its character. To provide against loss of pressure by the friction of contracted passages they should be made much larger than is the usual practice to day, and with more easy outlines and curves.

Another point worthy of attention is the exposed condition of some parts of passages. It is very common practice to make part of the outside wall of the saddle one of the walls of the steam passage, in other words, have but  $\frac{3}{4}$  in. of cast iron between steam at a temperature of 360 deg. and the outside air whose temperature may be anything between 70 deg. above zero and 30 deg. below. Many master mechanics think the common steam chest casing not sufficient, and are now putting asbestos on both steam chest and cylinders. This is a move in the right direction and should be supplemented by covering any exposed cylinder wall which has live steam on the other side of it. The under side of the cylinder saddle should always be boarded up to prevent a circulation of air around the passages.

The path of the steam to the cylinder has now been considered and considerable time given to it, because the writer feels that, generally speaking, railway men are more interested in the exhaust pipe and nozzles than in the live steam passages, and have let the latter go by default. The exhaust pipes and nozzles are, nevertheless, very important, and

opinions vary very much as to the best form and size. Ample area and easy following curves are just as essential for exhaust passages as for live steam, and there is not much of which to complain in this respect in the best designs of the day. We therefore come directly to the exhaust pipes and nozzles. The office of these is to afford an exit for the steam with the least possible back pressure, and at the same time produce a sufficient vacuum in the smoke box to give the necessary draught to the fire. It is evident that these two requirements are, in a certain sense, antagonistic to each other, for to make the steam create a vacuum on its way out is bound to cause more or less back pressure on the piston.

Did you ever calculate the horse power lost in one pound of back pressure when running at high speed? For an 18  $\times$  24-in. engine, making 225 revolutions per minute (corresponding to about 45 miles per hour with a 68-in. wheel) each pound back pressure throughout the stroke represents a loss of about 14 H. P. in the two cylinders. And 5 lbs. of coal per horse power per hour have been expended for it, and the railroad company is cut 70 lbs. of coal per hour for each pound of back pressure, while the engine is running thus. It is therefore very important that the back pressure be as little as is necessary to make the draught.

As everything pertaining to the draught except the pipes and nozzles is outside the topic assigned, we are limited to

these two. In considering them, one of the most important features is the position of the nozzle. To do its work to the best advantage the nozzle must be on the same centre line as the stack; in other words, it must be a single nozzle. Allowing the steam to shoot up first one side of the stack and then the other cannot be the best possible arrangement, though it may do better than a poorly designed single nozzle. When the latter is used, it will prove no better than double nozzles, unless the shape of the passage through the pipes is such that the steam goes out of the nozzle in a direct line for the stack. An exhaust pipe in which the passages run parallel to each other until within about 6 or 8 in. of the base of the nozzle, from which point they run quite abruptly into one, will be far worse than good double nozzles. Experiments, however, will produce an outline of a single nozzle, which will give excellent results, and not cause any perceptible rise in back pressure in one cylinder from the exhaust of the other passing through the nozzle and "blowing over" as it is commonly termed, and when such a result is achieved the double nozzles will no be comparable with the single. In no case does the writer believe that the nozzle should have a lip on the inside of the opening. The contraction of area should be obtained by a true conical shape, with no obstructions in the path of the steam. What would be thought of a nozzle for throwing a stream of water to a great height, which was the same internal diameter as the hose until, at a point a few inches from the end, it assumed an abrupt conical shape, and the exact size at the end obtained by an inside lip? And yet there are many exhaust nozzles of such shape in use on locomotives to-day, and the only valid excuse for using them is that the lip permits the use of one pattern for several sizes, as the lip can be bored out to suit, a practice which is far from economical.

The subject can be pretty fully summed up as follows: The steam passage should be straight as possible with no abrupt changes of direction, with ample areas, and fully protected from cold, while the exhaust should be just as carefully designed in regard to areas and easy following curves, and the pipes and nozzles should send a volume of steam of the largest possible diameter at the orifice consistent with a good draught, straight up the stack, with no variation, either to one side or the other.

In the discussion Mr. WILLIAM FORSYTH (C., B. & Q.) said that nothing had been said of the length of the steam passages. He had always favored a single exhaust nozzle. It was difficult to discuss a subject on which there was very little disagreement, and he would like to hear some views opposed to those of Mr. Marshall.

Mr. SARGENT (C. B. & Q.): I have some figures here showing the evaporation of engines with different nozzles. With  $\frac{3}{4}$  double nozzle and diamond stack, 5.6 lbs. of water per pound of coal boiler pressure;  $\frac{4}{5}$  single nozzle, straight stack, extension front, 4.9;  $\frac{4}{5}$  single nozzle, straight stack, diamond front, 4.2;  $\frac{2}{3} \times \frac{3}{4}$  double nozzle, straight stack and extension front, 5. These figures seem to show that the double nozzle with diamond stack gives the best performance, but they are hardly comparative, as the conditions were somewhat different. I think the fireman has a great influence on the evaporation. A poor fireman will always want a long nozzle.

Mr. RILEY (Mich. Central): I think the dry pipe is the most important of all. You will see a 16-in., 17-in., or 18-in. cylinder with a 6-in. dry pipe, and I don't think it is possible to get good results with a dry pipe of that size.

Mr. BARR: While the literature on the subject inclines to a single nozzle, I have not been able to get as good results out of the single as out of the double nozzle. It is not as easily adjusted. The steam passes intermittently through the single nozzle, and if you make it larger you should at the same time alter the size of the pipes. In the single nozzle the steam opening is down where the two pipes come together and the single nozzle may be 4 in. or 5 in. in length, and make very little difference on the velocity of the steam, as it passes the tip, because that is to a very great extent dependent on the size of the double part of the exhaust pipe. If that is as small as the tip of the single nozzle, and it very often is, then it does not make very much difference whether or not you enlarge that tip to twice its size. With our tests the action of the single nozzle was of too intermittent character. The steam passes out more in sudden puffs rather than being drawn off, and it makes a very severe pull and varies the vacuum, while with the double nozzles you can regulate the vacuum and it is more uniform.

Mr. CLEAVER: We noticed one thing in particular in changing from the double to the single nozzle, and that was the difference in the exhaust. It was very noticeable. The exhaust was much softer and apparently more continuous. I think we noticed that on every engine where the change had been made, and while it is pretty hard to tell about the amount of sparks that were carried in the front end, it seemed as if there were not so many. So far as the consumption of coal was concerned, there seemed to be no difference, and we made no tests to get at that part of it. I notice that Mr. Marshall says that the shape of the exhaust nozzle should be a cone, a true cone, I believe he says, and he also calls attention to the fact that most roads like to use the same pattern. Now would it make any difference if we made this cone for our smallest engines and then bored through into that cone in a parallel line? Would that cause the trouble that he lays to the lip? The steam would approach it in the shape of a cone and then would escape in a parallel line with the stack.

The next subject discussed was that of standard axle-box for 40,000-lb. and 60,000-lb. cars, and the best box lid. The discussion on this subject was very brief and of no importance.

The subjects announced for the next meeting are: "Best Metal for Brake Shoes;" "Compound Locomotives," their efficiency as compared with single engines.

The following resolution was offered by Mr. George M. Sargent:

Whereas, An organization has been effected in this city, the object of which is to secure to Chicago the World's Exposition in 1892; and

Whereas, The importance of the movement is being recognized by the various railroads centring here, as well as by all classes of business, therefore,

Resolved, That we, the members of The Western Railway Club, believing as we do that the World's Exposition, if held in Chicago in 1892, will prove of inestimable value to our whole country, and especially to Chicago and the Northwest, pledge ourselves to do all that lies in our power toward securing to this city the World's Exposition in 1892.

Seconded and carried.

#### Premiums for Economy in Fuel and Repairs.

There appears in a recent issue of the *Bulletin* of the International Railroad Congress an elaborate paper on the subject of economy in fuel, lubricants and repairs as affected by the system of premiums. The author of the paper is Mr. A. Borodine, Chief Engineer of Motive Power and Rolling Stock of the Southwestern Railroads of Russia. He has applied the premium system to the repairs of engines, freight

cars, round houses, etc., as well as to firing and oiling. What follows is condensed from this paper.

At present the allowances on Mr. Borodine's system are based on anterior expenditures, adding 3 to 4 per cent. for contingencies. Different allowances have been allotted for winter, spring, summer and autumn.

To incite the employés to economize in the consumption of fuel, their share has been increased, so that more than one-half the saving is included in the premium.

Taking for unity Cardiff coal, the consumption of fuel per 10,000 axle-verst (one verst = .6629 mile) is given in the following table:

1879. 1880. 1881. 1882. 1883. 1884. 1885. 1886. 1887.

No. of goods (one

pood = 36.114

lbs..... 245 200 171 171 167 164 161 161 152

which makes it evident that since 1880, when the new system of premiums was introduced, there has been a considerable reduction in the consumption of fuel. As to be expected, the reduction in the last years became more gradual, since it was approaching the minimum consumption possible to obtain under the actual circumstances.

Up to the year 1879, when the Kive-Brest and Odessa were united into one company, which took the name of the Southwestern Company, there was a difference of 50 per cent. in the amounts allotted by the administrations of these lines for lubrication of the locomotives. The allowances were retained in the sections corresponding to the former lines until 1880. When this abnormal difference, which, while in keeping with the real expenditure, could not even be justified by the difference in fuel, viz., wood and coal, attracted the attention of the management, and caused the establishment of uniform allowances and premiums for lubrication of locomotives. These allowances created general discontent among the engineers on the southern section of the line, and their discontent increased at the expiration of the first few months, when they, having exceeded the amount fixed for the consumption of lubricants, found themselves obliged to pay the established fine. They endeavored to prove the impossibility of keeping within the allowances, but the management proposed that the malcontents enter an apprenticeship in the northern sections of the line, where the consumption of lubricants was very small. Though none of them availed themselves of this proposition, nevertheless, the final result was a considerable reduction in the cost for lubrication, and at the present time cases of excess rarely happen and only as isolated examples. The above mentioned case leads the author to believe that the excessive consumption of lubricants in the past has been caused largely by the too large allowances for this object. The employés consider the allowance as a limit not to be exceeded, and if they succeed in making the least saving, and thus obtaining a premium, they are satisfied with this result, and consider that they cannot do better. For this reason the author has always considered large allowances injurious, and that in such cases the premiums cannot bring about the desired end. The allowances should be so small that the employés of little zeal, experience and intelligence can obtain no advantage, that those of ordinary capacities can fulfill their duties without incurring losses from excess of consumption. In a word that the premiums be profitable only to employés of superior zeal and experience. The consumption of lubricants during the last seven years per 100 versts run by the locomotive is given in the following table:

	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.
Livres	5.22	3.74	3.14	3.04	2.93	2.73	2.68		
Total expenditure (in roubles).....	93,671	45,631	35,926	19,581	25,126	18,832	11,983	11,021	
Livres consumed per 10,000 axle-versts.....	23.3	11.0	7.4	6.7	6.8	6.3	5.8	4.8	
No. of cases of heating per 10,000 axle-versts.....	0.45	0.21	0.17	0.18	0.12	0.11	0.10	0.09	

To reach better results yet, some modifications in the regulations were introduced in 1886, encouraging the engineers to use a smaller quantity of oil of a better quality, and allowing generally the use of cheap oils, after being assured that they could be used without injury. With this object, the allowances for lubricants have been replaced by their values in money. The efficaciousness of this measure was not long in showing itself, and the results have surpassed anything that could be expected, as the following table shows:

#### PROPORTION OF TALLOW TO OIL.

	Before the modification		After the modification.	
	1884	1885	1886	1887
Oil.....	48 per cent.	51 per cent.	86 per cent.	90 per cent.
Tallow.....	52 per cent.	49 per cent.	14 per cent.	10 per cent.

The expenditures for lubrication of the locomotives has decreased as indicated hereafter:

	Before the introduction of premiums.								After the change of the regulations.							
	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	
Per 100 Versts = (66.29 miles of train : In kopecks (kopeck = about 0.0058)																
Total expenditure for lubricant in roubles (rouble = \$0.582).....	130	103	96	84	79	78	57	45	38							
	98,967	63,282	59,869	57,373	55,935	42,943	21,358	22,506								

Thus the expense for lubrication is only about one-half what it was in 1885, and only about one-sixth as compared with that of 1879.

The development of the premiums for economy in the lubri-

cation of cars presents, according to the author, great interest, for it brings into relief the influence of the system of premiums for economy, and the immense power that it has exercised in uprooting abuses and in bringing back the employés to the paths of probity and industry. Up to the year 1880, in spite of the excessive consumption of lubricants for the cars, the number of cases of hot boxes, often causing breakage of the axles, was considerable. It was evident, on one hand, that the employés charged with oiling the cars stole the lubricating materials, and on the other that the negligence and carelessness in the use of these materials was unbounded. Taking the employés in the very act of selling the oil and tallow for their own benefit had no appreciable effect, for in the end one robber was dismissed and another taken in his place. Under these circumstances Mr. Borodine saw no other means of putting an end to the pillage and negligence than to render them unprofitable.

In the first place, owing to the difficulty of checking and controlling the operations of the oilers attached to each station, they were replaced by others, who accompanied the trains. Afterward certain allowances and premiums were fixed upon, and on the other hand fines were imposed upon the employés charged with the lubrication of the cars, for each case of a hot box or breakage of an axle, a fine heavy enough to make a failure of proper lubrication decidedly burdensome to them.

The results obtained were as follows: On Oct. 10, 1880, an allowable consumption of 18 livres per 10,000 axle-versts was fixed upon. In spite of the high figure of this allowance, during the first months it was necessary to impose numerous fines for over-consumption, which caused general complaint, and in one of the sections the resignation of the employés charged with the oiling of the cars. Nevertheless, the management remained firm, and did not revoke the rules promulgated on this subject. After this the consumption diminished rapidly, so that after Sept. 1, 1880 (probably a misprint, should be 1881—Trans.), it was possible to reduce the figure for the allowance, and it was fixed at 16 livres per 10,000 axle-versts; and a little later, that is to say, Dec. 10, 1881, it was fixed at 12 livres. In the order of Sept. 3, 1882, it is 9 livres; in the order of Dec. 18, 1882, it was reduced to 7 livres, and lastly, on March 1, 1886, it is only 6 livres per 10,000 axle-versts. The decrease in the consumption was so rapid that it was scarcely possible to keep track of it, and it was necessary to continually change the allowances in order that the premiums should not be too large.

At the same time, the cases of hot boxes became more and more rare, and they were never followed by breakage of the axle. All this was effected while retaining the same personnel, and all measures for controlling and checking the consumption were abandoned as useless. The foregoing proves that the system of premiums could transform employés, far from conscientious, into useful and honest agents. The following table shows the results accomplished:

	Before the introduction of premiums.							After the introduction of premiums.							
	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.
Total expenditure (in roubles).....	93,671	45,631	35,926	19,581	25,126	18,832	11,983	11,021							
Livres consumed per 10,000 axle-versts.....	23.3	11.0	7.4	6.7	6.8	6.3	5.8	4.8							
No. of cases of heating per 10,000 axle-versts.....	0.45	0.21	0.17	0.18	0.12	0.11	0.10	0.09							

In regard to premiums for maintenance and mileage of locomotives, the following table shows the results attained:

	Before the introduction of premiums.							After the introduction of premiums.							
	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.
Expense for repairs, small and ordinary, to locomotives and their accessories per 10,000 train-versts, (in roubles).....	23	20	19	19	19	17	16								
Mean distance run between two repairs in the shops (in versts).....	78,267	91,969	88,175	96,062	118,274	123,654	146,570								

to make the system of premiums for important repairs rational it was indispensable to found it on bases which should follow reasonable economy and not suspend the expenses necessary for a good locomotive service. After long preparatory work, the regulations for premiums for repairs of locomotives and tenders in the shops were promulgated July 1, 1885. The results given in the following table show that the expenses which had grown up to the year 1885 decreased after the introduction of the premiums.

	Before the introduction of premium.						After the introduction of premium.	
	1881.	1882.	1883.	1884.	1885.	1886.	1887.	
Mean expenses for repairs in shop per engine repaired (in roubles)....	3,403	3,595	3,775	4,342	4,215	3,733	3,985	
Same per tender repaired.....	492	624	582	591	613	527	512	

As to the condition of the engines, it improved in proportion to the reduction of the expenses for repairs, as is proved by the decrease in the number of accidents to locomotives en route, as follows:

1881.	1882.	1883.	1884.	1885.	1886.	1887.	
One accident to a locomotive en route on a mileage of versts....	34,500	49,000	38,400	47,100	52,400	33,000	115,150

Repairs to freight cars constitute one of the most important items of the operating expenses, and it is difficult, and in part even impossible, to regulate them. Considering the fact that freight cars are repaired at all points of the line, as well as on those of other companies, the putting in practice a system of premiums for economy in these repairs presents a problem difficult of solution. If each point where repairs are made were engaged simply to reduce the expenses, it is evident that the said stations would endeavor to get rid of the damaged car, and to send it to a neighboring shop, or perhaps repair it just sufficiently to put it in condition to quit their section of the line. This persuaded M. Borodine and those associated with him that the premiums for repairs and maintenance of freight cars should be divided among the railroad shops, giving them all equal advantages, with the exception of some special work. The means of interesting the points where the repairs are made have been found, by making the premiums depend not only on the number of cars examined and repaired, but also upon the number put out of service in consequence of accidents. The fixing of the allowances presented another difficulty. It is evident that the total expense for repairs to cars depends in part on the mileage made during the course of the year—but in what measure? It is certain on another hand that there are cases where this expenditure has nothing to do with the mileage, and again cases where it may depend on the mileage of previous years. On what base were the allowances to be allotted? This question was resolved in the following manner: For expenses where a unity of expenditure could be found and determined, this unity was the starting point, such as the construction and reconstruction of cars, repairs to wheels, etc.; for expenses which did not depend, or depended very little, upon the mileage of the current year, allowances were allotted by conforming to the expenditures for preceding years—thus for periodical examinations and important repairs; for unimportant repairs the amount was based on the mileage, and finally the painting was excluded from premiums.

The reduction of the cost for repairs since the introduction of the premiums is shown in the following table:

Before the premiums.	After the introduction of premiums.	1882.	1883.	1884.	1885.	1886.	1887.
Total expenditures for the year (in roubles).....	1,090,830	1,010,934	839,202	918,589	878,343	805,165	

Expenditures per 10,000 versts of cars (in roubles).....

54.81 44.46 36.65 33.08 39.47 30.41

Thus it is seen that the expense diminishes after the introduction of premiums, and if the decrease is less noticeable the author attributes it to the fact that the regulations are founded on the principle of partnership, which excludes the immediate and personal profit of each of the employés which contributed to this saving.

After the middle of 1883 other premiums were introduced for current expenses of round houses, etc., resulting in considerable economy in these expenditures. Premiums have also been introduced into several other departments, but which have either not been in force long enough to make a showing, or else the nature of the work is such that it is impossible to present the results in form for convenient comparison.

#### The World's Fair.

On Friday last, at a meeting of the New York Committee on Site and Buildings for the proposed exhibition of 1892, the following resolution, reported by the Executive Committee and amended after discussion, by inserting the words "if necessary," was adopted:

"Resolved, That this committee recommend to the General Committee that the site be selected from the lands between Ninety-seventh and One Hundred and Twenty-seventh streets, Fourth avenue and the North River, comprising Morningside and Riverside Parks and the intermediate lands; Central Park north of the large reservoir if necessary, and the lands adjacent to that part of Central Park."

The discussion which followed the presentation of this resolution was somewhat bitter, and Mr. Green remarked, unofficially, that he thought the members of the executive com-

mittee were lunatics. He and some of the other speakers who took part in the discussion endeavored to make the assertion good, the principal arguments against the proposed site being the following:

That the private land was held by about 700 different owners, and could not be secured without great delay and expense; that the Bloomingdale Heights would not be available for at least two years; that there was a law forbidding the use of Central Park for exhibition purposes; that Congress would meet in December, and the New York Legislature in January, so that even if the law relating to Central Park could be repealed, it would only be after great delay; and that, finally, the adoption of this resolution would stir up bad feeling in the community, when harmony was so desirable. The advocates of the site showed plainly by their remarks that while they were willing to make an apparent effort for the exclusion of Central Park, necessity would probably force its appropriation. The resolution was finally adopted by a vote of 14 to 2, the negative votes being cast by Messrs. Agnew and Green.

The Executive Committee also submitted a preliminary report, recommending that proposals and plans be invited for the principal buildings, as follows:

Area.	Estimated cost.
Main building.....	\$2,000,000
Machinery hall.....	2,500,000
Agricultural hall.....	750,000
Horticultural hall.....	450,000
Art building.....	600,000

The committee estimated that the ground required for the exhibition would be 200 acres, the principal buildings requiring about 80 acres. A special committee was directed to ascertain the terms on which the private land included in the proposed site could be secured.

As anticipated in the discussion at this meeting, the proposal to use Central Park has aroused much angry discussion in the daily press. The papers opposed to this proposition are the *Tribune*, *Evening Post*, *Commercial Advertiser*, *World*, *Mail and Express*, and *Telegram*. It is, of course, difficult to determine the views of the majority of the community, but the popular vote in the *Herald*, which was closed on the 20th inst., may be of interest:

Van Cortlandt Park.....	3,829
Staten Island.....	3,116
Inwood.....	3,291
Port Morris.....	2,165
Central Park.....	1,322
Washington Heights.....	235
Prospect Park.....	202
Bay Ridge.....	201
Pelham Bay Park.....	169
10th to 12th St. and Fifth to Tenth Aves.....	148
Crotone Park.....	107
Blackwell's and Ward's Islands.....	107
Riverside and Morningside Parks.....	83
Scattering.....	591
Total votes.....	15,975

An interesting parallel, carrying a possible warning, is found in two statements made at long intervals. During the discussion referred to above, Mr. Cooper said: "I have come to the conclusion that if we are to have the Fair at all, it must be in the city of New York, and in the Central Park, and if that won't do we might as well give up the idea." The following remark is from an editorial published in the *Sun*, Nov. 22, 1880: "Mr. Henry G. Stebbins is of the opinion that the ultimate success of the World's Fair project will depend on the adoption of Central Park as a site. If he is right, then the sooner the project is abandoned the better. The game is not worth the candle." It will be remembered that the project was abandoned.

The Committee on Legislation held their first meeting on Sept. 19, and organized by the election of Mr. Chauncey M. Depew as Chairman and Mr. W. E. D. Stokes as Secretary. The Chairman was authorized to appoint an executive committee which should outline the work for the general committee.

The Committee on Finance has not presented any report up to date, and same impatience is manifested at the delay.

Mr. John H. Starin, representing the domestic steamship interests, has written a letter to the Mayor stating his confidence in the financial success of the exhibition, and guaranteeing a subscription of \$500,000 from the domestic steamship companies if the site is chosen on Manhattan Island, and other interests will contribute in like proportion. Mr. Roswell P. Flower has also sent a check for \$25,000 to the Mayor, for use, if necessary, by the Committee on Site and Buildings.

This brief summary shows that nothing definite has yet been accomplished, the selection of a site being simply a recommendation which must be acted upon by the general committee. Should this recommendation be ratified, we are promised a vigorous campaign in the approaching election for members of the New York Legislature, where pledges for or against the law relating to Central Park will play a prominent part.

While discord and inaction prevail in New York, Chicago is by no means idle. A stock company has been incorporated, and has received subscriptions to \$5,000,000 of stock. A second issue of \$5,000,000 is now being floated. In addition to this, vigorous efforts are made to affect public sentiment. Many congressmen have been interviewed, and pledges of their votes for Chicago have been obtained. St. Louis also has entered the field, and has raised over \$3,000,000 of a \$5,000,000 guarantee fund. Should the site of the exhibition pass to the West, New York will only have its own apathy to blame, augmented by the discord which the proposal to use Central Park has excited. The protest against this site may be sentimental, as is claimed by many, but the history of the past shows that sentiment is not an opponent to be despised.

#### Massachusetts Railroad Reminiscences.

Referring to the coming 50th anniversary of the opening of the Western [Boston & Albany] Railroad from Worcester to Springfield, Mass., Railroad Commissioner Edward W. Kinsley, of Massachusetts, says: " \* \* \* Was it not Springfield's honor to have furnished the will and the way of first demonstrating to the civilized world the possibilities of long-distance railroading? Such mission the builders of the Western Railroad from Springfield to Albany had to accomplish. By successfully pushing their road over the mountains to the Hudson River they once for all solved the problem of rail connections despite the obstacles of nature.

"I remember that day (Sept. 27, 1839) as well as what I ate for dinner. Did not Bill Edwards, Abe Chapin, George Bliss, Jim Harding and I go down to the corner of what is now Chestnut and Lyman streets [Springfield] to fire a little cannon in true Fourth of July style? \* \* \* The inception of the movement for the railroad between Springfield and Boston was a little before my time, but I distinctly recall hearing Nathan Hale, of Boston, tell the people at a mass meeting in the old town hall [Springfield] that he expected to see the day when seven people could go to Boston [100 miles] on a train twice in one day. Nathan Hale was one of the chief workers for the railroad at the Boston end. He was then editor of the *Advertiser*, and was father of Rev. Dr. E. E. Hale. But the men who bore the brunt of the later enterprises were George Bliss and others, who have already been noticed many times. The first train run over the road would now be regarded as a curiosity. The cars were chained together, and the engine weighed but 10 tons. It took over five hours to go to Boston at a bumpety-bump pace, while today a freight train with hogs runs from Chicago to Boston in 60 hours. But never mind that: the road to Boston was built. What was the next problem? The road to Albany. Why, young man, I believe that the grand scheme of a continuous line of railroads reaching to St. Louis (for Chicago was unheard of at that time) was first conceived right here in Springfield. The great problem in railroad construction was still unsolved. To be sure, the first railroad in Manchester, England, had been built, and the Baltimore & Ohio was under way.

"The Baltimore & Ohio people waited for George Bliss, P. P. DeGrand, of Boston; Justice Willard, William Bliss and others, from this vicinity, to solve the problem. The work was soon undertaken. The engineers were West Point graduates, Maj. James W. Whistler, Capt. William H. Swift, Capt. John Child and William Howe. Major Whistler, after the successful completion of the Western road to Albany, built the Boston & Providence and the Providence & Stonington roads. Then he went to Russia at the call of the Czar Nicholas and built the railroad between St. Petersburg and Moscow. He died there some years ago. Mr. Howe, who invented the Howe truss bridge, also went to Russia with Major Whistler. Well, while the Western road was building over the mountains, the work was constantly being inspected by engineers from abroad and agents of foreign governments who took deep interest in its progress. The real crisis in its construction came when what is now Canaan tunnel [550 ft. long, through hard rock, near the state line between Massachusetts and New York] was reached. The credit of first conceiving the idea of a tunnel on a curve belongs to a young engineer, or assistant engineer, named Foster, who at that time lived in Springfield. That tunnel was the triumph of the railroad engineering of the day, being the first ever built for the iron horse. What became of young Foster I do not know. I think it was his brother who was instrumental largely in having the New York elevated road constructed. His achievement was surely potential of wonderful results. The mountain safely passed, it was comparatively an easy matter to bridge the Hudson and enter Albany. \* \* \* The men who pushed the Western Railroad through Canaan tunnel, nearly 50 years ago, had a large share in working out the industrial revolution. It was certainly large enough to redound to the credit of this city. It may not be generally known how near the present Boston & Albany Railroad Co. came to owning a continuous line to Buffalo. Chester W. Chapin had an opportunity to buy for \$10,000,000 the various roads in New York state, but not being supported here by the Legislature, New York parties quickly absorbed them, and then began the gradual concentration of the various small roads between New York and Buffalo that now form the New York Central.

"It's a wonderful history; the story of railroading could not be written with Springfield left out. But the younger generations realize its significance about as much as I did the significance of selling some Boston papers to Daniel Webster and Lord Ashburton at the union station one day about 1840 or 1841, before the Southern road from Hartford had been built. I've got now the silver sixpence Mr. Webster gave me. Both seemed impressed with the thought of reading Boston papers in Springfield on the day of publication.

"I think that no other railroad in the country graduated so many young men who have made their mark in railroading everywhere as the old Western Railroad and its great successor, the Boston & Albany. I meet them everywhere in my travels. Most of them got their inspiration from the Springfield railroad pioneers. That fact is second only to the conquest of the mountain yonder. Yes, sir, I think that the semi-centennial of the opening of the railroad to Boston is worthy of notice. And yet, although an event of less local interest than the other, the construction of the road to Albany was of far greater significance to the outside world. And what has come of it? You can send a barrel of flour from Chicago to Boston as cheaply as a pair of boots from Springfield to Palmer."—*Springfield Republican*.

#### A High-Speed Vertical Condensing Engine.

An engine embracing some features of interest is shown at the Paris Exposition by the French firm of Lecouteux & Garnier. It is a vertical high-speed condensing engine, with automatic cut-off, running at 300 revolutions per minute, and designed for electric lighting. It has a 15-in. cylinder and 11-in. stroke, and is fitted with a piston valve. Regulation is effected by a shaft governor, and, in principle, is not unlike the system adopted in many automatic engines of American make. The modifications introduced, however, are novel. There is, as usual, a weight, of which the centrifugal force is counteracted by a spring, not a technical spring, however. Besides these there is a small oil pump serving the office, in a measure, of a dash pot. More than one weight and spring may be used, several having been employed in other engines of similar design by the same makers. The eccentric is guided in its rectilinear movement by two round, parallel rods, and is moved either one way or the other by the influence of the weight or of the spring, as the case may be, changing the point of cut-off to suit the requirements. The action of the governor is claimed to be instantaneous. The resistance of the oil pump may be varied by changing the area of the discharge orifice for the oil.

The condenser is arranged at the side of the engine base, and notwithstanding the high speed, a vacuum of 26½ in. is claimed. The air pump is double acting and works at the same speed as the engines. It is fitted with a plunger with a conical end working within a relatively very large pump chamber. The engine is rated at 150 horse power.



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#### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

**Advertisements.**—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

We call especial attention to the table published on another page showing the gain in the wear of driving wheel tires which may be had from the use of a brake shoe of the Ross pattern. It is to be regretted that the committee did not get similar data from other railroads, so that in the average of a large body of observed facts accidental irregularities might have been eliminated and a fair measure of the increase in mileage obtained. But the data in this one table are enough to justify the committee's conclusion that by the use of a shoe of the Ross type the mileage run between turnings may be increased 500 per cent. over that obtained with a plain shoe. The direct economy of the tires is but a small part of the saving which must result from such an increase of mileage. The indirect saving from keeping the engine out of the shop until other repairs than turning tires are necessary, and the saving of damage to track from hollow tires must be taken into consideration. Perhaps the motive power department cannot be expected to consider this last element, but it is a very important one nevertheless.

At the meeting of the Western Railway Club in Chicago last week, two subjects were discussed; one, Exhaust Pipes, Nozzle and Steam Passages; and the other, Standard Axle Box for 40,000 and 60,000-lb. Cars, and the Best Box Lid. The meeting was well attended, but the discussion was very unimportant, partly, perhaps, because the topics were well worn, and partly because, as expressed by one present, the members agreed so well that discussion was impossible. However, regarding the journal box and lid, the expression was unanimous that the present design is not satisfactory and does not meet present requirements, either in appearance or in operation; and we don't see how it could have been otherwise. What we must have is a box that is practically oil and dust tight. While watching an average freight train pass slowly out of a yard at the commencement of a journey of, perhaps, 500 miles, and seeing the streak of new oil running on the old layer of black gum (the remains of the oil supposed to have been used for lubrication months ago, and so charged on the books of the company) toward the rim, and observing the absence of lids, the straggling tresses of waste hanging from the place where the lid ought to be, one must wonder at the patience which still tolerates the customary journal box. But this state of things cannot prevail long, for railroad officers are learning how absolutely unnecessary it is to use a box which lets oil out and dust in. Within four days a master mechanic has told us of a box which ran twenty months without the addition of a particle of lubricant.

In the paper on Exhaust Pipes, Nozzles and Steam Passages, there is general direction for the arrangement of those details, with little definite, accurate in-

formation regarding the effect of different designs. The reason of this is simply that there is no such information available. It is not in the books, and that which exists has not been collected from the many and widely distant places where it lies and so reduced and compared as to enable one to form definite and accurate general conclusions. It will be seen that a majority of the members who discussed the paper favored single nozzles, yet the evidence was of the slightest, and the experiments cited could not prove that either was superior to the other. Probably the facts are that so many other conditions enter into and make up the environment of the subject that no data yet procured are complete enough to enable a decision to be made as to whether a double or a single nozzle will produce a better and more uniform vacuum in the smoke box with the same back pressure in the cylinders. In making such experiments the utmost care should be taken to have all the conditions that can possibly bear upon the subject known beyond a doubt. A simple evaporation test, or a difference in sound of exhaust or back-pressure line will in no wise decide the matter. The smoke box vacuum, the back pressure, the pressure at the time of the exhaust, the opening through the tubes, the condition of the tubes with regard to soot, the opening of the dampers and fire doors at the time the exhaust is measured ought all to be considered. The paper refers to the uselessness of the sharp lip on the exhaust nozzle at the tip. While the use of this lip may not be clear to all, it has yet a theory attached that has some reason in it. Its purpose, as expressed by the patentee of the Farmer exhaust, used extensively on several of the New England roads, is to remove from the exterior of the cone of the exhaust steam issuing from the nozzle all jagged perturbances and stray jets. It is supposed to reduce the friction of the exhaust steam in the pipes to a minimum by permitting the enlargement of the pipes nearly up to the nozzle. But whatever be its effect, good or bad, there is one thing that it surely does, it gives a different sound to the exhaust for the same sized nozzle under otherwise equal conditions. All of this simply aids in proving, as in fact the whole paper and discussion of the subject before the club went to prove, how little is known regarding this important subject.

With respect to live steam passages the paper calls attention to one of the most common defects of locomotive cylinders, *i. e.*, the contraction of the steam passages where they pass over the cylinder barrel into the steam chest and the obstruction of the steam entrance by the balanced valve of the usual form placed in locomotive steam chests without special preparation, but as in the preceding case no definite tangible data are given. The importance of this subject and the condition of the information thereon can be seen from the following question propounded not long since to engineers and railroad men who had been experimenting with the indicator\* on locomotives: "What is it that causes the wire drawing so evident and indisputable in the steam admission to the cylinders of locomotives? Is the throttle or the dry pipe too small, are the branch pipes or steam passages contracted in area, the steam chest obstructed by the valve, the area of the steam ports insufficient, or the motion of the valve so slow at the time of admission as to result in a contraction of the steam port which otherwise would be large enough?" The replies were, of course and necessarily, evasive. In general, it may be stated that no one knows just where the cause lies, neither is it known just how much of the back pressure on the indicator card results from the nozzles on the exhaust pipe and how much is due to the valve action and the exhaust passages, particularly that passage from the cylinder to the valve seat through which the live steam passes during admission. In the *Railroad Gazette* of April 26, in answer to a correspondent, the amount of the vacuum in a smoke box of a locomotive under ordinary conditions was stated, but no conclusion can be reached from the data regarding the minimum amount of back pressure needed in the cylinders to produce it. Also in the *Railroad Gazette* of July 12 will be found the experiments of H. G. Manning upon the Central Vermont, which show the amount of wire drawing, but from them cannot be deduced the causes, with their various amounts, which produced it. There is no more inviting topic for the experimenter, and none in which he can be so useful, as in that of the effect of steam passages and valve movements on the initial steam pressure and that of the parts played by the exhaust nozzle, passages and valve action on the back pressure in locomotive cylinders.

The interesting articles on the counter-balancing of locomotives, recently published in our columns, have attracted the partial attention of the *Railway Master Mechanic*, as appears by a criticism in the September

issue of that journal. The attention seems to have been only partial, for the critic apparently did not read the articles carefully. He thinks that if the cranks of a locomotive were on the same centre line, it would be impossible to prevent an occasional stop on the centre, in spite of all efforts; that the locomotive would be subject to pulsations or jerks; that the *Railroad Gazette* advocates the use of a starting engine; and that the experiments with such an arrangement of cranks would be preposterous. A literary critic once wrote a scathing review of a book which, as it turned out, only existed in his imagination. The critic of the *Railway Master Mechanic* is not exactly in the same plight, since the articles which he criticised do exist, only he does not seem to have read them. The writer who proposed to set the cranks on the same centre line gave some good reasons for thinking that the pulsations would be small with trains such as are hauled in the United States, whatever might be true of English practice. The facility of operating a single engine without sticking on the centre is also abundantly proved in American practice, and has frequently been noticed by English engineers with surprise. No recommendation for a starting engine has been made in the editorial columns of the *Railroad Gazette*, although the great complication feared by our critic would be no, more than obtains in the case of the reversing engines sometimes fitted to locomotives. The object of the editorial, as the critic would have seen if he had read it carefully, was to answer a correspondent, who thought that a starting engine must have the same dimensions as the main engines. We cheerfully plead guilty to the charge of recommending the experiments which our critic considers preposterous. While abstract discussion is valuable, experimental data is still more desirable. The present system of balancing locomotives is generally regarded as unsatisfactory; and if an improvement is recommended by respectable authority, it does not seem well to condemn the suggestion without trial, particularly when a test can be made with little trouble and expense.

#### The Associations and their "Friends."

We commented briefly last week on the part taken in recent years at the conventions of certain railroad associations by that body known as the "supply men." Every one knows what this term means, and therefore we shall, for want of a better one, use it without quotation marks or other suggestion of reservation or disapproval. Since the publication of the paragraph referred to we have received a number of letters on the subject. Some of the writers show an amount of heat amounting almost to inflammation. Others are mildly explanatory, and there are various opinions on the subject. One writer tells us that it is a duty to expose a condition of things that is little less than scandalous. Another says that if a few gentlemen wish to be polite to their friends it is no one's business. On one hand it is said that the members of the associations are put in an undignified, if not compromising, position by allowing the supply men to pay for their carriages, flowers, bonbons, theatre parties and excursions, that it is obvious that they have no opportunity to return these compliments and courtesies except as such opportunity may come up in the intercourse of individuals throughout the year. Therefore they are put under obligations to the supply men whether they realize it or not. It is said further that the assessments for entertaining have become really burdensome. At Denver, for instance, they amounted to \$110 each for those supply men who went from the East. On the other hand, it is said that the exhibits are the most instructive part of the conventions, and that but for the entertainment provided by the supply men these assemblages would be so dull that they would be scantily attended. All of these things we know very well, and we know that all of the argument is not on one side. But what we said last week remains true; that there should be no appearance of interference by outsiders in the politics of the conventions, and that the ostentation of the entertainments will certainly injure the associations if it is kept up.

There is a proper course for the members of the associations and for the supply men to pursue which is clear. It is quite proper that any one who has some article which he wishes to bring to the notice of railroad officers should exhibit it at the conventions of those officers. It is desirable that he should. It is a convenient way of imparting and gaining knowledge; and the exhibits at some of the conventions, particularly at that of the Master Car Builders, have lately come to be really valuable features. Moreover, there can be no objection to a reasonable interchange of courtesies between the railroad men and their friends, the manufacturers and dealers. That is liberalizing, and is a

good prophylactic against narrow-mindedness. But when the courtesies get to be so conspicuous, so expensive and so one-sided as they have lately become, they are objectionable. Doubtless no great harm is done directly, but the influence of the associations is lowered. The members are put in an undignified position by repeatedly and habitually accepting favors which they cannot return. If they do not realize this so much the worse for them. It is seen and realized by others. The standing of their conventions is lowered and the weight of their recommendations is lessened by facts which really have no significance, but which look badly. Fortunately the Master Mechanics and the Master Car Builders are very careful about recommending standards, and escape the suspicion of having been influenced by such trivialities as carriages, excursions, and convention "entertainment" in general; but the Roadmasters have not been so discreet. We mention these three associations because they are the only ones, so far as we know, the members of which have allowed to grow up the singular custom of permitting people who have something to sell to their employers to pay the cost of amusing their wives and daughters, and themselves as well, at their conventions. Were such a thing to be suggested at a convention of the American Society of Civil Engineers, or Mechanical Engineers, or the Institute of Mining Engineers, it would be looked on as an impertinence.

Fourteen years ago the Master Car Builders' Association saw the false position in which they might be put, and unanimously adopted the following preamble and resolution, which is quite a model of good taste and dignity, and is still printed each year in the published report of their proceedings:

*Whereas,* The practice of entertaining the members of this Association by its friends has become an established custom, and has thus assumed somewhat the character of an obligation to which those who have so generously dispensed hospitality have, in measure, felt themselves obliged to conform; and

*Whereas,* The expenditure of time and money for this purpose has, in many cases, been very much greater than the members of this Association have a right to expect should be devoted to their enjoyment; and

*Whereas,* The expense of such hospitality has in some cases been interpreted as having a significance which has been the cause of embarrassment to members;

*Therefore,* We desire by this resolution, first, to express our thanks for the liberality of our friends in the past; and, secondly, to make the request in this public way that in the future there shall be no more expenditure of money for the public entertainment of members of this association.

It would be well if the next M. C. B. convention should dig up this neglected resolution and let it be known as the present sense of the association; and a good many of the warmest friends of the other associations would be glad to see them take the same position.

#### Locomotive Tests and Their Results.

Elsewhere on this page we have alluded to lack of data on fundamental matters of locomotive practice. What is the true reason for this lack of information? Is it that the data is impossible to obtain, or is there a lack of opportunity and funds to reach the results? Surely there is no lack of talent in a country where exists some of the best technical schools in the world, so many of whose graduates enter the field of railroading. That something hampers the experimenter in locomotive mechanics is evident, because every engineer who has had occasion to read up the different divisions of the subject is aware how very unsatisfactory is the great mass of tests of locomotives in service under present systems. One reads the records with regret that this or that vital point was not determined, and cannot be much impressed with the importance of tests that require half a dozen apologies for the lack of conclusiveness and for uncertainty in the deductions. Recent examination of much data gathered from locomotive tests during the past ten years shows the conclusions drawn therefrom to be most unsatisfactory and conflicting.

This being assumed to be the condition of knowledge regarding the fundamental principles of the operation of locomotives, and of those differences which make one locomotive more economical than another, would it not be well for railroad companies to co-operate in this matter, and, for the good of all, obtain as nearly as possible the same amount of accurate knowledge regarding locomotive engines as is available with reference to the stationary and marine engine? Careful investigation and experiment have diminished by fully half the cost of performance of stationary and marine engines in recent years. Is there any reason to suppose that the same percentage of increase could not be obtained in the case of the locomotive? Probably no one expects to obtain the same degree of efficiency—that is, the same power from each pound of coal—in the case of the locomotive as in that of a stationary or marine engine plant: but ought we not to expect a

like percentage of increase in economy if we follow similar lines of careful investigation? It is commonly said, for instance, that in many cases less fuel is required per mile run at high speeds than at low, with the same train. Now if this be the truth in general, and for all or nearly all trains, then the fact ought to be made plain to all railroad managers. And one may be sure if they were once well aware of this truth, if it be a truth, there would be a marked change in time-tables. In another case the results would teach us that the handling of fuel by which it is much broken up is greatly detrimental to its economical consumption. This loss is stated to be so great that the advantages to be gained, if the statements be true, by a proper sizing of the fuel, make it one of the most profitable fields for investigation in connection with economical railroading. It is to settle just such questions as these—live and important ones—that we need the results of experiment. At first sight one may be appalled by the seeming amount of investigation necessary to obtain data suitable for the general solution of all problems of fuel consumption and locomotive economy; but if we were in the possession of a few backbone facts which were indisputable, branches would quickly grow to the tree of knowledge, and the lines of experiment would become much easier and simpler when we had learned just where to look for defects.

Other branches of mechanics have had like difficulties to overcome, and have brought out of chaos a chain of knowledge tying together a bundle of facts which otherwise were so scattered that they were about useless. In electrical mechanics can be found an instance of this. Scarcely five years since it was most discouraging to design a dynamo, and almost impossible to bring out a satisfactory motor which would be even half way efficient at the first trial. It was only by the "cut-and-try" process throughout that a fairly good result could be obtained. After being built the first time the dynamo or motor was found to always have one or more of several defects. The bobbins in the armature or pole pieces heated, the capacity of the machine was small and the range limited, and the fire at the commutator threatened to outrival in brilliancy the arc lamps that the machine was vainly endeavoring to operate. As with the locomotive, the necessity appeared of locating the difficulty, and exactly as is the case with the locomotive, it might be found to be in several places. Too much or too small wire on the armature, too much or too little iron in the core, too much iron in or a wrong configuration of the pole pieces, an insufficient strength of field magnets, an insufficient number of bobbins in the armature; and in many other places the cause of defect might be found. So it is with locomotives; the grates may be too small or too large, the tubes too few or too many, the steam and water space may be too little or too great, or in the steam pressure, valve motion or exhaust nozzles may be found the defects that cause one locomotive to be less economical than another. But quite to the contrary from the development of the locomotive, the dynamo has been drawn from its unknown state, and with it the electric motor also, and to-day their peculiarities are so well understood that the possible combinations of iron and wire that can be made in constructing them, without seriously affecting their economy, are well understood, and the various sizes and designs now offered for sale differ but little in economical working. And, further and more to the point, special designs for use in odd places, such as on shipboard, are fearlessly built without preliminary experiment, thus showing the confidence of the electrician in his knowledge of the essential principles of the machine.

The *Journal of the Franklin Institute*, in its review of mechanical progress recently, stated that but little increase of economy need be expected from the dynamo for some time to come, as it had already reached about 95 per cent. Now it must not be supposed that this development was the result of a lucky stroke of fortune or a happy idea, because it was not so. The records of financial failures of electric companies, and the scrap heaps and laboratory exhibits of the surviving companies, tell the tale of vast numbers of costly experiments, and bear evidence of many failures in this short period. One naturally inquires, now, for the conditions which have permitted the rapid development of a most intricate machine in so short a time, while knowledge of the locomotive is still so inaccurate. It cannot be said that in the case of the locomotive there has been any lack of experiment, because a slight review of the matter shows no adherence to a single design, but, on the contrary, a wide variation both in design and dimension. But there is a difference in the class of the experiments in the two cases which may account for

the difference in development. In the case of the dynamo and motor experiments the machines were surrounded with the most accurate instruments of measurement, and the results of each change in proportion and dimension carefully noted. No attempt was made by the experimenters to deceive themselves; they had no babies to nurse; it was merely a question of dollars and cents to those directly connected with the actual trials of efficiency. In proof of this, if one will take the trouble to look carefully into the development of dynamos and motors, he will find many cases of carefully plotted curves of potential from the commutator, curves of magnetic intensity from the field and pole-pieces, and curves of efficiency from the whole machine, all of which show clearly the exact location of existing defects. Now this is the class of work that needs to be done for the locomotive. It is not theoretical work beyond the reach of the railroad mechanic or beyond his understanding when expressed in curves and diagrams upon paper; but it does require the highest degree of unprejudiced search after truth, regardless of the detail or device that may suffer by the revelations.

#### Transportation of Hard and Soft Coal.

One of the New York papers announces a civil suit against the Erie by one of the individual mining firms for discriminations in the rates on coal and privileges accorded. The particulars of the suit have not been made public; but it is supposed that it will bring before the civil courts substantially the same questions which were involved in the case of Coxe Brothers & Co. against the Lehigh Valley Railroad, heard before the Inter-state Commerce Commission last March, and not yet decided. Mr. Franklin B. Gowen is counsel in this case, as in the other. If the matters are difficult of satisfactory solution by a commission of specially selected men, who are experts on the equities of the case, it may be predicted that no court of law can bring the trouble to a just issue.

The Coxe case was based upon three main allegations: 1st, that the rate on anthracite coal should be the same per ton per mile as now charged on bituminous coal; 2d, that direct discrimination was made by the Lehigh Valley against Coxe Brothers and in favor of the Lehigh Coal Company, a corporation owned by the railroad; and 3d, that the rate charged on anthracite to tide water was unreasonable. As these in substance must be the charges in the civil suit, it is of interest to shippers and carriers of coal to give the reasons for and against the complaints. As to the first charge, the question of cost of carriage was gone into with the general result that if there was any difference it was in favor of hard coal; that all coal should be carried at the same rate because no difference was made by railroads in rates on pig iron, lumber, etc., because of difference in price or quality; that some kinds of soft coal were worth more than some kinds of hard, and that the rates were the same on both kinds in many other parts of the country.

To this it was replied that hard coal was worth 75 cents per ton more than soft, while the latter, for steam-producing purposes, was worth to manufacturers 10 to 25 per cent. more, hence an even rate would not affect the relative consumption; that anthracite was shown by statistics to be more and more used for domestic purposes exclusively, and that hence the rates on the two kinds were as separate as any two distinct articles, and that a verdict for the complainants would not help the sale of their coal at all.

The second charge, of discrimination, has some very delicate questions. The stock in the coal company is owned entirely by the railroad company, hence the complainants say that the rate on coal is put extortionately high to shut out individual operators, while the losses of the coal company are borne at last by the railroad company. It was alleged that the coal company sold at tidewater coal which cost them, mining and transportation, more than the selling price, and that the rate to individuals should be determined by deducting the cost of mining from the tidewater price. To this it was replied that the coal company made a profit each year, and if it lost something on some sales and gained on others it was in the ordinary course of business, and like all other corporations and merchants in this respect. Besides, the coal company had a distinct and separate charter and could not be rightly brought into court, even if it gave coal way.

In proof of the third charge that the rate on hard coal was unreasonable (\$1.80 per ton to Perth Amboy), the average distance was taken and the average rate from all anthracite mines was found to be 1½ cents per mile, while merchandise was carried for .009½ cents, and hence the complainants contend that the former is unreasonably high for such traffic. Then the rates to Buffalo were analyzed and found to be for hard coal 5@7 mills, which was assumed to be the normal rate eastward. The real reason of the high rate to tidewater was the theory that the traffic would bear it—a theory which the complainants consider exploded as a basis of rates. To this the railroad replied that its charter allowed 3 cents per ton-mile, that the rate to Buffalo was fixed according to special circumstances such as the competition of hard coal with the cheap soft coal at the west, that the Buffalo rate had no relation to and was no criterion of the rate to Perth Amboy, and that there was no way of fixing rates per se on any commodity. Complainants alleged that Delaware & Hudson made a profit of 32 cents per ton after royalty, against Coxe Brothers' profit of ½ cent per ton. This was

done by a cheap contract with the Erie, equal to about the profit as against other operators.

The coal transportation last year was about 130,000,000 tons, of which 40,000,000 were anthracite and 90,000,000 bituminous. The total acreage of anthracite coal in the world is supposed to comprise 470 square miles. The acreage of soft coal in Pennsylvania alone is 11,000 square miles, and in the United States 200,000 square miles. The anthracite coal fields of Pennsylvania cover about an area, including the distances between collieries where no coal is mined, of 60 miles in length by 60 or 70 in width, in which practically all the hard coal of the United States is produced. This small supply of hard coal seems to preclude the idea of its deliberate exclusion from competition with soft for manufacturing purposes by the railroads. The carriers are only carrying out in their tariff differences which nature has placed in the extent and firing values of the coal. Individual operators are slowly giving way to great companies, and at least part of this must be ascribed to the legitimate advantages which organization gives to large capital well handled. The idea of a grand union or trust of owners of all the anthracite mines has lately been again revived.

#### **Smokeless Coal Burning.**

There are certain subjects connected with railroad operation which are aired so frequently that it seems a needless task to return to them. It must be remembered, however, that each year brings new accessions to the ranks of our readers, and truths which may seem hackneyed to those old in the service come with fresh force to those just entering the field. It is well, also, to call the attention of the older heads occasionally to principles of importance which are not always carried out as closely as they should be to reach the highest economy upon their roads.

Such are some of the reasons for returning to the subject of smokeless combustion. The matter has also been lately brought to mind by the action of the New York Board of Health in ordering the New York Central to use anthracite in its engines while running through the thickly-settled parts of the city. The smoke nuisance has not been so great an evil in New York as in many of the Western cities, owing to the better quality of soft coal in general use and the more common employment of anthracite. It is on this account, perhaps, that any marked emission of smoke is quickly noticed and proceeded against.

The comparatively smokeless burning of coals either in locomotive or stationary boilers is closely connected with fuel economy. There is such a variety in the composition and physical characteristics of the various coals of the United States, from the Pennsylvania anthracite, with 90 per cent. or over of fixed carbon, to the light coals of some of the Western states, with fully 55 per cent. of volatile matters and impurities, that material differences are necessary, both in construction of boilers and in the manner of firing. With such differences in character of fuel, no general rule can be laid down, but each master mechanic will have to be largely guided by the particular coal on his own road and the class of traffic that he has to deal with in designing boilers for his motive power.

There are, however, a few general principles connected with the economical and smokeless use of coal, whether for locomotive or stationary boilers, to which it is well to refer occasionally, as the general performance of boilers of either class is by no means what it should be.

In all bituminous coals we have to provide for two different classes of combustibles, *i. e.*, the fixed carbons which remain upon the grates until their combination with oxygen is completed, the ash dropping through the grates, and the volatile gasses, mainly hydro-carbons, which are driven from the coal when it is heated to such a point as to render incandescent the fixed carbon. A plentiful supply of air must be provided for burning these gases, a neglect of which gives rise to much waste of fuel and the production of smoke, causing much discomfort in many cases. In some coals having but a small proportion of fixed carbon, the heating power in the volatile gasses, if perfectly utilized, is fully one-half of the total amount in the fuel as a whole. Even with anthracite coals there is a certain proportion of combustible gas driven from the top of the coal through an imperfect oxidation of the carbon upon the grates which requires a supply of air above the fire for its combination. It is claimed by many writers and mechanics that this air supply must be introduced by carrying a thin fire upon the grates, so that a surplus can pass through the spaces between the individual lumps of coal. Practically, however, there are but few coals with which this can be done, and few patterns of fire boxes which will allow a draught slow enough to burn a thin fire. The larger the grate surface the slower the rate per square foot at which coal can be burned with a given draught; the thinner the fire can be kept the larger will be the proportion of air which will come through the grates. The fact that some air must be let in above the fire is not sufficiently appreciated.

The increasing tendency toward economy in railroad operation is directing greater attention to coal consumption, which forms one of the largest items of expense upon any road. For average bituminous coals the improvements of the best practice are in the direction of large grate surfaces, thin fires, air admission above the fire and increased flame-way before reaching the tubes. These conditions permit a slower draught, thus allowing better opportunities for the admixture of air with and combustion of the gases. This desirable result is advanced by the increased average flame travel allowed before reaching the tubes. Boilers constructed according to the prevailing tendency in design, as just noted, can with fairly efficient firing give a high performance and

be almost smokeless even with inferior coals. We have in mind at present engines burning slack bituminous coal of a poor quality, which after a half dozen exhausts make absolutely no smoke with the heaviest work. With properly designed fire boxes and with careful firing locomotives should show much higher steaming powers than at present, and also they should be comparatively free from smoke and sparks. This result can be got without the use of complicated devices.

These foregoing general principles apply to all stationary boilers which, as a rule, can be made to give a better performance than locomotives, the conditions being more advantageous. We have seen within the last few days a stationary boiler of the locomotive pattern running on inferior coals with but little smoke; while the chimneys of neighboring establishments were belching out sooty clouds. This was done by the simple device of a series of two-inch holes around the box near the line of fire allowing the air to enter by the influence of the natural draught. There is but little excuse for any boiler that is large enough to do its work easily and economically being allowed to make a marked amount of smoke either in locomotive or stationary practice.

#### **Annual Report.**

*Boston & Albany.*—The change of the fiscal year so as to end June 30 leaves only 9 months' figures, and prevents full comparisons with previous years. The results of these 9 months are as follows:

Earnings—Passengers.....	\$2,655,455
Freight.....	3,240,533
Total, incl. miscellaneous.....	6,528,984
Operating expenses.....	4,657,887
Net earnings.....	1,871,097
Interest due and accrued.....	585,508
Rentals.....	1,200,000
Dividends.....	39,000
Surplus not divided.....	46,589

The profit is somewhat greater than these figures would seem to indicate, because all the taxes for the year, and a more than proportionate share of interest charges, were assignable to the nine months in question.

The volume of business, both freight and passenger, is greater than in the corresponding period of the year previous. In passengers the increase has been slight; but passenger rates have fallen so little as to leave a slight increase in earnings from this source. On the other hand, while freight tonnage has increased five per cent. and freight movement (ton mileage) six per cent., freight earnings have fallen more than one per cent. The average receipts per ton mile have been reduced from 1.11 cents in 1888 to 1.03 cents in 1889. This is considerably higher than in 1885, and about the same as in 1881, but much less than in other years.

The general balance sheet remains substantially unchanged in its main items.

In another column will be found the resolution adopted by the Committee on Site and Buildings for the proposed exhibition of 1892 in New York, recommending the appropriation of the upper portion of Central Park for the site. Should this recommendation be indorsed by the General Committee, to whom it has been referred, there is strong probability that the fair will be held in the West, where the people are not wasting time in discussing sites, but are raising money and influencing public sentiment. If it is true, as has been stated, that Central Park is the only available site for a World's Fair in the city of New York, there is little chance that the project will materialize; because the best and most influential sentiment of the city is strongly opposed to what is regarded as the desecration of Central Park. But it is by no means true that Central Park is the only available site; and in view of the angry discussion which has resulted from the resolution passed by the Committee on Site and Buildings, there is some hope that the General Committee will see the wisdom of reversing the decision.

A serious grade crossing collision occurred in the suburbs of Chicago on the evening of Sept. 24. A freight train ran into the rear car of a suburban passenger train, which was standing on the crossing. The engineer of the freight train barely escaped lynching. He was put under arrest, and, it is said, had the appearance of a man who had been drinking, and has the reputation of being a drinking man. He is said to have asserted that he did not see the red light of the semaphore signal. We do not know the conditions at this crossing, but if there is any place where a derailing switch should be used, it is at a grade crossing. Whether the runner of the freight engine was drunk or sober, he could not have wrecked the passenger car if his own engine had been put into the ditch before getting to the crossing.

The Baldwin Locomotive Works are to build for the Erie three more of the large 10-wheel passenger locomotives of the same type as those recently built for that road. These engines represent the heaviest class of passenger motors in service, and their use increases the belief that the six-wheeled coupled locomotive will be the engine adopted for heavy express service in the near future. These locomotives have 20-in. x 24-in. cylinders, 68 in. drivers, weight 127,000 lbs. exclusive of tender, and have 97,000 lbs. available for adhesion. They are adapted for burning anthracite fuel.

#### **TRADE CATALOGUES.**

*The American Chilled Car Wheel.*—This is a pamphlet prepared by the New York Car Wheel Works, of Buffalo, N. Y., for foreign distribution. It gives a short and elementary history of the use of chilled cast-iron wheels in America, of the methods of their manufacture and of recent

improvements, including, of course, the machine introduced by that company for grinding and balancing chilled wheels. The company offers to furnish plants for the manufacture of 100 wheels per day for £12,000, contracting to put the machinery in operation and furnish men competent to superintend and educate others to carry on the business. It is a commendable step toward introducing the American wheel and processes into foreign markets.

*Illustrated Catalogue and Price List of Warner & Swasey, Manufacturers of Iron and Brass Working Machine Tools, Cleveland, Ohio.*

This is a very nicely printed catalogue, containing illustrations of 15 or 20 tools, including boring and drilling machines, milling machines, screw machines, lathes, etc.

#### **TECHNICAL.**

##### **Locomotive Building.**

The Texas & Pacific has received ten more of the engines being built for the road by the Baldwin Locomotive Works.

The Louisville, New Albany & Chicago has received one of the six large passenger engines recently ordered, four of which are to be run between Chicago and Louisville hauling express trains, and two between Monon and Indianapolis hauling the day and night express trains.

The Rhode Island Locomotive Works has delivered four of the 12 freight locomotives which it is building for the Fitchburg road. Six of these are consolidation and six mogul engines, and they will be used on the heavy grades near the Hoosac Tunnel. They are built after the designs of the Fitchburg road. The consolidations have cylinders 20 x 24 in., and weigh in working order 113,500 lbs. The moguls have cylinders 18 x 24 in. The following new engines are being built at these works: Three for the New York, Providence & Boston; six-wheeled switching engines for the Bessemer Iron & Steel Co.; Bessemer, Ala.; 10-wheelers for the Georgia Southern & Florida; standard 8-wheelers, 10-wheelers for freight and six-wheeled switchers for the East & West of Alabama; a number of 10-wheelers for the Kansas City, Fort Scott & Memphis; 10-wheelers for the Columbus Southern and a couple of Forney's to go to Los Angeles, Cal.

##### **Car Notes.**

The Wheeling & Lake Erie has asked for bids on 500 coal cars, 250 to be delivered in October and the same number in November.

The Fort Wayne, Cincinnati & Louisville is negotiating for a half dozen new passenger coaches.

Two new passenger cars for the Puget Sound and Gray's Harbor Road recently arrived from the East.

The Minnesota Car Co., of Duluth, has been reorganized as the Minnesota Iron Co., with a capital of \$2,000,000, to smelt and manufacture pig iron, build railroad cars of all descriptions, locomotives, marine and stationary engines and machinery, etc.

The Tyler Car & Lumber Co. has been organized at Tyler, Tex., with a paid up capital of \$100,000, and will engage in the manufacture of cars and lumber. The castings which it contemplates using will be made from Texas iron ore.

Two hundred Riordan refrigerator cars are being built for the Chicago, Milwaukee & St. Paul at the works of the Kansas City Car & Manufacturing Co., and of the Haskell & Barker Car Co.

##### **Bridge Notes.**

The contract for removing the old wooden bridge over the Kennebec River, at Bangor, Me., and building a new iron bridge, has been let to Cofrode & Saylor, of Philadelphia, Pa., at \$25,000. There will be one span of 200 ft. and two of 100 ft. each.

The towns of Westerly, R. I., and Stonington, Conn., have contracted with the Berlin Iron Bridge Co., of East Berlin, Conn., for a wrought iron parabolic truss bridge to span the Paucatuck River. The extreme length of the bridge is 122 ft., with a span 118 ft.

Proposals are wanted until Oct. 21 for the construction of an iron wagon bridge at Shoshone Agency, Fremont County, Wyo.

The Board of Public Works has decided upon the plans for the Sixth street bridge in St. Paul, Minn. The work of constructing the bridge will probably begin early next spring. The bridge structure will cost \$155,000, and the approaches for Brady street and Sixth street about \$20,000.

The town of Oconomowoc, Wis., has decided to build a new iron bridge across the river near the Townsend House. It is probable the city will also build a new iron bridge over the outlet to Lac la Belle this fall.

James Shanahan, Superintendent of Public Work at Albany, N. Y., has invited bids for building the following bridges, the superstructure and substructure to be let separately in each case. For building an iron bridge over the Erie Canal at George street, in the city of Rome. For rebuilding bridge over the Erie Canal at Main street, in the village of Fultonville. For building an iron bridge over the Tonawanda Creek and Erie Canal, at Delaware street in the village of Tonawanda. For building an iron bridge over the Erie Canal at Liberty street, in the city of Schenectady.

Eighteen bids were received for the construction of an iron bridge over the Clarion River, at Clarion, Pa. The contract was awarded to the Wrought Iron Bridge Co., of Canton, O., who bid \$10,450.

The Northern Pacific will erect a bridge with a 100-ft. span at Twentieth avenue, North and First street, in Minneapolis.

The County Commissioners have been asked to replace the bridges in Evansville, Ind., at Water and Franklin streets, with new iron ones.

The County Commissioners will build a new iron bridge at Newville, N. Y.

The Shawnee (Kan.) County Commissioners have received bids for the construction of four iron bridges over Post Creek on the line between Shawnee and Wabaunsee counties; over Six Mile Creek, north of Auburn; over Tecumseh Creek at Parson's crossing, and over the Shungununga Creek on Coddington road in Topeka township. Bids were presented by the following companies: Wrought Iron Bridge Co.; George G. King Bridge Co., of Des Moines, Ia.; King Iron Bridge & Mfg. Co., of Cleveland, O.; Missouri Valley Bridge Co., of Leavenworth; St. Louis Bridge & Iron Co., of St. Louis; Lane Bridge & Iron Co., of Chicago, and the Columbus Bridge Co., of Columbus, O.

##### **Manufacturing and Business.**

The Marion Steam Shovel Co., of Marion, O., is to build this fall a brick extension to its shops, for erecting and painting purposes, to be 50 x 200 ft. long. The company's

business the past year has been so good that its present extensive works have been too small to allow it to meet orders at all times as promptly as it desired.

The Walker Manufacturing Co., of Cleveland, O., has just been awarded a contract for cable winding machinery for a cable road to be built in Seattle, Wash., by the Pacific Cable Construction Co., of San Francisco, Cal.

The Niles Tool Works, of Hamilton, O., have recently received the following orders: One 60-in. pulley lathe and one 60-in. pulley borer for Stockholm, Sweden; one 22-in. engine lathe to Saxony, and one to Italy; one 10-ft. planer to the De La Vergne Refrigerator Co., New York; one 8-ft. planer each to the Midvale Steel Co., Philadelphia, and to the Morgan Engine Co., Alliance, O.; one 54-in. slotter to the Midvale Steel Co., and two 30-in. slotters to the United States Government.

The Wright Manufacturing Co., of Philadelphia, are offering to sell to railroads and other corporations the right to make for their own use the Wright bolt, of which the company is the sole manufacturer.

The Avery Stamping Co., of Cleveland, Ohio, has just completed one of the largest hydraulic plants in this country for extra-heavy pressing and stamping of sheet metals. This company stamps and presses sheet metals, and makes a specialty of this class of work for railroad uses, such as car construction, bridge plates, etc. This company claim to be the only one in the United States who can put sheet metal into intricate shapes, for instance, like a cylinder, and keep a uniform thickness all over.

The National Hollow Brake Beam Co. has changed its chief office and works from St. Louis to the Phenix Building, Chicago. The following are the officers of the company: Henry D. Laughlin, President, vice Wm. H. Barnum, deceased; E. B. Leigh, Vice-President and General Manager; Arthur Crandall, Secretary, and L. C. Burgess, Superintendent.

The Taylor Manufacturing Co., of Chambersburg, Pa., report sales and installations of "Beck" automatic engines during the past few weeks, together with boilers, etc., both for electric light, power and railroad service, and also general power service to the number of 34. Complete plants have been put in at Roanoke, Va.; Alexandria, Va.; Piedmont, W. Va.; Eufaula, Ala.; Knoxville, Tenn.; Sycamore, Ill.; Buffalo, N. Y.; Taunton, Pa., and other points. Among the orders is one for three "Beck" engines, with boilers, etc., complete, for the Watervliet Electric Railway, of Albany, N. Y., the longest electric road in the country, on the Thomson-Houston system. Orders have also been received from the Bat n Rouge & Dearborn Railroad Co., Detroit, Mich., operating the Sprague system, and from the Thurmond Coal Co., Arbuckle, W. Va., two engines for driving electrical coal mining machines.

#### Iron and Steel.

The Allegheny Bessemer Steel Co. is making an important addition to its steel rail mill at Duquesne, Pa. A contract has been let to the Swindell & Smythe Construction Co., of Pittsburgh, for a soaking pit furnace, which will be built at once. This will increase the capacity of the works fully one-fourth. Other improvements are contemplated. The mill is working full.

The two anthracite blast furnaces of the Keystone Furnace Co., which failed recently, were this week sold in Reading, Pa., to the Reading Iron Co., subject to a mortgage of \$175,000. This gives the Reading Iron Co. control of four furnaces, besides its numerous mills. In two weeks all four furnaces will be in blast.

The Etoah Iron Co. has purchased the iron and manganese property of the Etoah Iron & Manganese Co., including 17,400 acres of land near Cartersville, Ga. The officers of the company are A. O. Granger, President; Jos. M. Gazzam, of Philadelphia, Vice-President, and Thos. Parkes, General Manager.

The new pipe foundry of the West Superior Iron & Steel Co., of West Superior, Wis., is rapidly nearing completion. It is reported that excellent loam and sand have been found close to the foundry.

The Vanderbilt Steel & Iron Co. has been organized at Trenton, N. J., by Charles G. and Ferd W. Roebing, Samuel K. Wilson, John H. Scudder and County Clerk Moore, all of Trenton, N. J. The capital stock is \$200,000. The company will maintain an office in Princeton, N. J., and another in New York, and will manufacture iron, steel, lime and coke in Birmingham, Ala.

Shoenberger & Co., proprietors of the Juniata Iron and Steel Works, at Pittsburgh, will shortly commence the erection of an additional six-ton converter to the Bessemer plant.

The Lancaster Iron Co., of Pittsburgh, has been granted a charter. The directors are Edwin H. Smith, Charles S. Crawford, Charles C. Morrow, W. A. Schmidt, William Beal, L. H. Mathews and Frank W. Smith.

The Swindell & Smythe Co. have just contracted to build two large regenerative gas furnaces for the Iowa Barbed Wire Co., of Allentown, Pa.

W. W. Kurtz & Sons, Valley Iron Works, Coatesville, Pa., manufacturers of boiler, bridge, ship and tank plates, have recently put their large mill in operation, so that now they have two running with 96-in. and one with 119-in. rolls. A third train with 72-in. rolls will soon be in operation. They contemplate also making improvements in their plant by adding new buildings, putting in additional cranes, etc.

The entire plant of the Aetna Iron & Steel Co., at Bridgeport, Ohio, is being operated to its utmost capacity. The new furnaces and gas producers recently added to the plant and built by the Swindell & Smythe Co., of Pittsburgh, are in operation and giving excellent satisfaction. The furnaces are of the following sizes: The guide-mill furnace, 6 ft. 3 in. by 14 ft.; the plate-mill furnace, 7 by 14 ft., and the producers each 12 ft. high and 9 ft. 8 in. in diameter.

Isabella Furnace, at Barneston, Chester County, Pa., which was destroyed by fire six months ago and then rebuilt, resumed operations this month.

Mary Furnace, of the Ohio Iron & Steel Co., at Lowellville, Ohio, which has been idle for some time undergoing repairs, resumed operations last week.

Bids have been opened at the War Department, Washington, D. C., for the supply of one hundred 7-in. and fifty 11-in. steel cast shells for the Ordnance Bureau. The bids were as follows: Standard Steel Casting Co., Thurlow, Pa., 7-in. shells, \$59.50 and \$64.85 each; 11-in., \$127 and \$137 each (each size of shell being divided into two classes, with octagonal and round cavities, respectively). Midvale Steel Co., Philadelphia, 7-in. shells, 40c. and 33c. per lb.; 11-in. shells, 37c. and 30c. per lb. W. H. Long, Goodhue & Co., Burlington, Vt., 7-in. sh. lls., \$46.08 and \$51.84 each; 11-in. shells, \$132 and \$145.20 each. The shells are to be delivered, one-third in 60 days, one-third in 75 days and one-third in 90 days after contract.

#### The Rail Market.

**Steel Rails.**—The market is firm, with \$29 quoted at Eastern mills, although this price has not been secured for large

orders. Still, it is believed by some that \$30 will soon be generally quoted. A number of steel works are running on large orders for billets. Among recent sales reported by Eastern mills the largest single lot is 10,000 tons for Southern delivery. The Chicago market is now quoted at \$33, while Pittsburgh is asking and for small lots getting \$31. The Illinois Steel Co. has advanced its price to \$33, at mill, for heavy sections and to \$36 for 30 lb. and 35 lb. rails on such quantities as can deliver during the last two months of the year. A great many inquiries for round lots have been received, the aggregate quantity being nearly 150,000 tons. These inquiries are almost entirely from railroads in the Western territory.

**Old Rails.**—At New York quotations are \$24@\$24.50; at Pittsburgh sales of 1,300 tons have been made at \$26@\$26.25, and at Chicago the quotations are \$24.75@\$25.

**Track Fastenings.**—The Eastern manufacturers now ask \$2@\$2.05 for spikes and 1.9@1.95c. for angle-bars. At Pittsburgh spikes are still quoted at 2.10c., 30 days, on cars at works in Pittsburgh; splice bars, 1.80@1.85c.; track bolts, \$2.75@\$2.85. In Chicago quotations are as follows, f.o.b. Chicago: Steel splice-bars, 1.95c.; iron splice bars, 1.90c.; spikes, 2c.

#### Telephone from Paris to London.

According to French journals, the French government has under consideration the project of establishing communication by telephone between Paris and London. Preliminary trials will be made with a cable between Dover and Calais, and on the lines Dieppe, Beachy-Head, and Havre, Beachy-Head.

#### Trial of the Ferryboat "Bergen."

This boat was described, with illustrations, in the *Railroad Gazette* of Aug. 9. The reader will remember that she has triple expansion and a screw at each end, the screws being 8 ft. diameter. Some changes have recently been made in the engine, and on the 18th a trial was made with the view of determining speed and engine and boiler performance. The trials were made during a run from Hoboken up the river to Newburg, covering a little over ten hours. From the incomplete figures available, it appears that the average horse power developed by the engines was about 715, with a consumption of water per hour per horse power of 21.7 lbs. The time required to pass between two points, 10 miles apart, was 55 min. 20 sec., showing an equivalent of 10.84 miles per hour. The log showed a speed of 13.26 miles per hour, the difference, 2.42 miles, representing the tide per hour. The slip amounted to 11.75 per cent. The engines made about 144 revolutions per minute.

#### Pumping Engines.

A lecture on "Pumping Machinery, Ancient and Modern," delivered before the class of Mechanical Engineering of Sibley College, Cornell University, by Mr. J. F. Holloway, has recently been published in pamphlet form. Mr. Holloway, after speaking of the achievements of the first hydraulic engine, passes to a brief consideration of the Cornish pumping engine, and then treats quite fully of the inventions of the Worthingtons, father and son, in direct-acting pumping machinery. He describes, in interesting language, the evolution of the modern pumping engine, beginning with the Worthington direct-acting steam pump, patented Sept. 7, 1841, followed by the direct-acting duplex steam-pump, which pump, in turn, was compounded for increased economy, and ending with a detailed description of the construction and operation of the Worthington high duty pumping engine, in which, by the use of compensating cylinders, any desired rate of expansion of steam is permissible.

#### Trial of the U. S. Steamer "Yorktown."

This steamer was tested for speed at Newport last week over a measured mile (geographical), and turning trials were also made. Such data as have been published in advance of the official report will be found below.

In the turning trials the steamer was started each time at a speed of 13 knots, the engines making 140 revolutions a minute. (It should be stated that the "Yorktown" has twin screws.)

#### Turning a complete circle, both screws going ahead.

Test.	Time of turning.	Angle of helm, degrees.
1	4 min. 40 sec.	32
2	4 " 42 "	34
3	4 " 54 "	28
4	4 " 57 "	28

#### Turning a half circle, both screws going ahead.

Test.	Time of turning.	Angle of helm, degrees.
5	2 min. 5 sec.	38
6	2 " 25 "	30
7	2 " 19 "	38
8	2 " 2 "	30

#### Turning a half circle, one screw going ahead, the other reversed.

Test.	Time of turning.	Angle of helm, degrees.
9	3 min. 20 sec.	18
10	3 " 32 "	16

The following table shows the average speed under various conditions, each average being the mean of several runs in the opposite directions over the measured course:

Revolutions per minute.	Average speed, knots per hour.
39.5	4.3
136	14.88
—	16.7
96	10.59
130	10.97
120	10.58

In the runs with forced draught it was found that the circulating pumps did not deliver sufficient water, so that the vacuum was greatly reduced. It is proposed to change these pumps, when a much higher speed may be realized.

#### English Canals.

From 1832 until the commencement of the Manchester Ship Canal no canal enterprise of any magnitude was attempted in England. About one-third of some 4,000 miles of canal and canalized rivers fell into the hands of railroad companies, and they have remained without any noteworthy improvement, so that on any through freight line, as between the north and south, or between the east and west, it is impossible to pass a boat of over 60 tons burden, and on most lines 40 tons is the greatest load that can be carried through, on account of mud and other débris that has been allowed to accumulate in the channels.

The high charges at Liverpool and the heavy freight traffic between Liverpool and Manchester led to the organization of the Manchester Ship Canal Co., and the commencement of its great work. Birmingham and Sheffield almost immediately organized companies for the purpose of following Manchester's example. Birmingham's first effort was for an outlet to the Severn River and the Bristol Channel by enlarging one or the other of the existing canals sufficiently to accommodate coasting vessels of 300 tons burden, but the presence of several tunnels by either route precluded a commercial success, and after some investigations and negotiations looking to a connection with the North Sea through "The Wash," near Boston, surveys have now been

made for a canal 72 feet wide on the bottom, to be navigable by vessels of 500 tons burthen, connecting with the Weaver River Navigation at Winsford and through that navigation and the Manchester Ship Canal to Liverpool. The estimated cost is £3,000,000, of which £750,000 is for hydraulic lifts. The estimated traffic is 10,000,000 tons per annum. The undertaking expects the assent, before Parliament, of the Weaver River Navigation, the Manchester Ship Canal and the Mersey Dock Board. Sheffield organized the Sheffield & South York-hire Canal Co., which proposed to, compulsorily, take the canals at present owned by the Marchester, Sheffield & Lincolnshire Railway Co., the compensation to be determined by the Railway Commissioners, and form a waterway, to accommodate vessels of 300 tons register, between Sheffield and Barnsley via Keadby-on-the-Trent, outletting on the Humber. This case is already before a Parliamentary committee in the hands of Mr. Pomber, Q. C., who was the attorney for the Manchester Ship Co., and showed his dissatisfaction with the famous opinion of Captain Easton on the Mersey tides by speaking of him as an engineer from the wild and woolly West. The latest plan for a large canal is to connect the Tyne through Hexham and Haltwhistle with the Solway. The Tyne is now, as the result of dredging, navigable for 15 miles, and a further improvement of 10 miles more would bring navigation to Hexham, only 40 miles from the Solway. This canal, if 30 ft. deep and without locks, would require a cutting of over 300 ft. in rock near Haltwhistle. No estimate seems to have been made for a canal with locks. It is thought that the canal, if built, would greatly increase the trade of Newcastle with America and that of the west coast of England with the north of Europe. It is proposed to apply for government aid, on the plea that it would have a great defensive value in case of war.

#### Tough Cast-Iron.

We have recently received from Rathbone, Sard & Co., Albany, N. Y., some specimens of cast-iron which manifest unusual properties. The specimens are pieces of metal about 1 in. in width,  $\frac{1}{2}$  in. in thickness, and some 15 or 18 in. in length. Some of these strips have been twisted so as to form spirals. Others have been wrapped up in coils. That cast-iron can be made very tough and a certain amount of elasticity imparted to it is known to many of our readers, but it is unusual, to say the least, to find in stove foundries any metal which will bear such tests as here indicated. The twisting and bending is done hot. The company assure us that there is nothing in the metal in these specimens, but a judicious admixture of good irons and the absence of old scrap. They make the assertion, further, that it represents their daily melt.—*Iron Age*.

#### Riehl's New Platform Scales.

Messrs. Riehl's Bros. are offering an improved self-adjusting coal, hay and cattle scale, which appears to be an apparatus of quite superior design. The system of rocking bearings and suspension links renders it sensitive and accurate, and yet it is so constructed as to be very durable. The hardened steel fulcrums of the main levers rest in rocking bearings supported by heavy stirrups. These, in connection with chairs, also fitted with rocking bearings, take the first strain of the load directly under the platform, thus protecting the delicate, knife edges. The adjustment and accommodation secure full and uniform bearings on the knife edges, and the rocking bearing system is continued through the scale. The main levers are placed high, to keep them out in the way of water or dirt, which is a source of trouble with shallow pits. The scale is furnished with a combination beam, which dispenses with the use of weights, the weighfog being done exclusively with the poises.

#### Vibration in Buildings.

One of the most perplexing problems that confronts the engineer is the vibration in buildings caused by running machinery. The character of the building, the ground on which it rests, the weight, power and speed of engines, are all factors which must be considered, some of which are very indefinite, or, at least, their effect is hard to pre-determine, combined with which is the very important influence, namely, the relation which the speed of the engine bears to the natural time of vibration of the floor beams. It is evident that if the slight motion which every engine has it exactly in time with the natural vibration of the floor beam, each pulsation of the engine will increase the scope of the vibration of the floor, resulting in a most disastrous shaking, while if the pulsations of the engine are in discord with the floor, comparative quiet will exist. As floor beams are usually long, and their time of vibration correspondingly long, it is usually found that a fast-running engine will give less of its vibration to the floor beams than a slow-running one. It is also worthy of note that the vibrations of fast-running engines are more numerous and less forcible, hence easier resisted by the mass of the floor. An interesting example of preventing vibration by discord was shown in the case of a Westinghouse 10 H. P. engine which, on an upper story of a silverware manufacturer, created such a commotion as to rattle the silverware on the shelves a hundred feet distant. A change of 25 revolutions in the speed, which change was in the direction of increasing of the speed, entirely stopped the vibrations. An interesting work of this nature, also, is in the coffee house of Arbuckle Brothers in Brooklyn, where two Westinghouse engines of 125 H. P. each are located on the fifth floor. These engines were erected on the heavy floor timbers, the floor boards being cut away and extra timbers inserted between the joists. Across the timbers were placed oak stringers, which latter have been seasoning since the war in some unfinished vessels in the Brooklyn Navy Yard. On these the engines were mounted with plain fly wheels, and experiments were conducted to determine the speed at which it would be best to run. It was found that at 204 revolutions the vibration was at the minimum and was very slight, being as little as that caused by any of the ordinary driven machinery. The speed was therefore fixed at this point, and the wheels then made to give the proper belt speed.

#### Opening of the Halifax Graving Dock.

The graving dock in Halifax, N. S., was formally opened Nov. 20 by Vice-Admiral Watson, of the Royal Navy. The dock is at the end of the harbor, adjoining the dock yard. It is 601 ft. long, 78 ft. wide, with 30 ft. of water over the sills. It is built of concrete and granite by S. M. Brookfield, of Halifax. The British provincial and municipal governments have aided the construction to the extent of \$600,000.

#### Bridge Accidents.

A quarter of a mile of the trestle of the Pensacola & Atlantic over Escambia Bay, 9 miles east of Pensacola, Fla., was destroyed by fire Sept. 19. The structure is 3 miles long. The fire is supposed to have caught from a passing engine.

On the 18th the falsework of the two south spans of the bridge being built over the Colorado River at Montopolis was swept away, together with a portion of the superstructure. The work is being erected by the King Bridge Co. The Central Pacific Railroad has recently suffered more or less loss of snow sheds from forest fires in the mountains. The structure known as the upper Cascade Bridge, a half a mile of snow sheds between Tamarack Station and the sum-

mit, have been destroyed, and for some days passengers were transferred. It is said that the bridge is now temporarily repaired and traffic over it resumed.

A bridge on the Southern Pacific over the Current River was recently burned. The fire is supposed to have been set by tramps who were put off a train.

The bridge over the Elm Fork of the Trinity River, 7 miles northwest of Pilot Point, Tex., was destroyed by floods. It was a county bridge which cost \$8,000.

#### Interlocking.

The Illinois Board of Railroad and Warehouse Commissioners has given permission for the use of the interlocking signals at Hegewisch, Ill., at the crossing of the Michigan Central and the South Chicago & Southern.

The interlocking system of switches and signals at Forest Hills station on the Providence division of the Old Colony railroad was put into operation last Sunday.

This company has now in service three interlocking towers, namely, South Plainfield, 12 levers; Mahoning, 6 levers; Packerton, 7 levers. At the Platteburgh tunnel a machine of 6 levers, not interlocked, is being put up. At Mahoning the Palmer torpedo is being put in place of derailing switches. The company has plans out for bids for interlocking at Dismal Gap, Allentown and Delano.

#### The Brazil Turnbuckle.

The turnbuckle which is shown in the accompanying cut is what is called the "Brazil" and is made by the Central Iron & Steel Co., Brazil, Ind., Anthony & McElroy, Philadelphia, Pa., General Agents. It has the advantage of the hexagonal form which admits of a good wrench hold in any position; and being open, the ends of the rods may be seen and their position and condition ascertained at any time. Tests of this turnbuckle have shown its reliability as to material



and workmanship. A test was made by the Phoenix Iron Co. with a 1 1/4 in. "Brazil" turnbuckle fitted to ordinary stub ends. A stub broke at 57,000 lbs. per sq. in., but the turnbuckle was uninjured. In a test of a 1 1/4 in. buckle fitted with Krupp steel stub ends at the shops of the Chicago & Northwestern, the stub broke at 82,000 lbs., but the turnbuckle was not injured. Other tests made in comparison with other turnbuckles have shown the good qualities of the "Brazil," and we are told that it is to be adopted by some of the larger bridge works.

#### The Winner Bridge.

It appears certain that the Winner bridge in Kansas City will be built. It is said that contracts have been made with the Keystone Bridge Co. and with H. S. Hopkins & Co., of St. Louis, for the construction. Mr. Hopkins has commenced operations by building shanties on the north side of the river. The bridge will consist of four main spans of 423 ft. each, centre to centre of end pins, and two south approach spans of about 270 ft. each, centre to centre. There will be another span of 150 ft. across the yard of the Hannibal & St. Joseph. Between this and the river will be a wooden trestle, and beyond it more wooden trestle, running down to within 10 ft. or 12 ft. of the surface of the ground. In all there will be about three-quarters of a mile of wooden trestle. The main spans are single track, with a narrow foot walk on each side, inside of the trusses, and a carriage way on each side outside of the trusses. The truss depth is 65 ft., and the panel length 23 1/4 ft.; that is, the large panels are 47 ft. long and subdivided. The structure is practically of steel throughout. The live load consists of two heavy engines, followed by a train weighing 3,400 lbs. per lineal foot. The engines weigh 416,000 lbs., in a length of 104 ft., and there are 120,000 lbs. distributed over a length of 15 ft. The highway live loads vary with the length of span and make the total equivalent uniformly distributed load 4,600 lbs. for the long spans, and 5,000 lbs. for the 270-ft. spans. The cost of the structure, including trestle, will be nearly a million dollars. Frank D. Moore, of St. Louis, is Engineer in charge. The designs have been made by Messrs. Waddell & Jenkins.

#### New Car Shops of the Pennsylvania.

Last week the Pennsylvania Railroad Co. let the contract for the erection of its new car shops at Walls Station, about 15 miles from Pittsburgh. The buildings will consist of one brick semi-circular repair shop, 432 ft. in diameter; a brick paint shop, 20 x 84 ft.; five iron buildings and a brick office building. When these structures are completed the men employed in the shops of the company now at Torrion and Brushton will be removed to Walls and the old shops may be abandoned.

#### The Norfolk Dry Dock.

The new dry dock, just completed, at the Norfolk Navy Yard was formally opened this week. It took one hour to pump the dock full, which contains 8,000,000 gallons of water, and the same length of time to pump out the caisson. The U. S. S. "Yantic," decorated with bunting, went into the dock under her own steam. The operation was a success in every particular.

#### Naval Affairs.

The board appointed to make a test of the gun-boat "Petrel" has reported to the Navy Department that the vessel did not develop the amount of horse power required by the contract. The deficit will cost the contractors \$5,521. The report says the workmanship reflects credit on the contractors, and that the vessel is strong enough to convey the armor and equipment intended for her.

The Navy Department is actively preparing to build the two 3,000-ton ships, which are to be built at the Government navy yards, as the bids of the private shipbuilders exceed the limit of the appropriation. In the Construction Bureau the advertisements for materials are being prepared, and will be published in a short time. Two months will be required before the bids are opened, in order to allow the bidders an opportunity to go over the specifications. Chief Engineer McElroy is drawing up lists of the tools that will be needed to build the engines for the vessels at the New York Navy Yard. Some small alterations will be necessary in the buildings, tracks must be laid to and in the erecting and machine shops, and a temporary traveling crane must be constructed. The boilers for the vessels are larger than those in the "Baltimore," while the vessels themselves are much smaller. Should the machinery come up to expectation the vessels will make at least 20 1/2 knots.

#### A Heavy Express Engine.

We have already noted the recent delivery by the Rhode Island and Locomotive Works to the New York & New England of a mogul express locomotive. The following details are from a local newspaper: The engine will haul the New York limited train, leaving Boston at 3 o'clock, to Wiliamantic without a stop. It was built after the road's plans. It has a 60-in. boiler with a straight barrel; 107-in. fire box; cylinders, 20 x 24 in.; drivers, 60 in. diam.; total wheel base of engine, 24 ft. 3 in., and weight, 128,000 lbs. The engine has a short, flaring stack, New England pattern, and solid end side rods of I-section. The main road is also of I-section. The tender has a water capacity of 3,600 gallons, and has a scoop for taking water while running from track tanks.

#### THE SCRAP HEAP.

##### The Texas Depot Law.

The last Texas Legislature passed an amendment to the act regulating railroads, by which each corporation operating a line in a city of 5,000 population or upward, provided there is no Union depot, is required to build a depot at intersections or crossings for the reception of freight and passengers. The freight department must be ample, and there must be a fire kept up on cold days and nights in the passenger rooms. In Waco three of the roads entering cross each other more than once, and as it is a city of 25,000 inhabitants, and without a Union depot, it is in all things subject to the amended bill referred to, and therefore the County Attorney has filed suit against the receivers of the Missouri, Kansas & Texas and officers of the St. Louis, Arkansas & Texas and the Houston & Texas Central asking for enforcement of the penalty, which is, for each day the corporation operates their lines in violation of the act, a fine of \$25.

##### The Quebec Bridge.

Edward Eiffel, son of the builder of the Paris tower, and M. Giel, his father's partner, have arrived at Quebec on business in connection with the proposed bridging of the St. Lawrence river between Quebec and Point Lewis, to unite the Canadian Pacific and the Intercolonial railroads. The estimated cost of the work is \$7,000,000.

##### The Congo Railroad.

A steamer sailed from Antwerp on the 25th for the Congo with 1,000 tons of rails. About the middle of next month a party of engineers and railroad builders will leave Brussels for the Congo to begin work on the Congo railroad.

The latest advices from the Zambezi announce that Portuguese have surveyed a route connecting Lake Nyassa with the sea.

##### Train Robberies.

The Texas & Pacific Express Co. was robbed of \$10,000 on the night of Sept. 19. A Missouri, Kansas & Texas car, which was left in the station at Belton, Tex., was entered through a window and the money taken from the safe.

On the morning of Sept. 25, at 3:10, a passenger train on the Mobile & Ohio was stopped by robbers at Buckalunna, a station 70 miles north of Mobile. Two men got into the cab just as the train was to leave the station, compelled the runner to proceed to a place convenient for their operations, and then "went through" the express and mail cars in the familiar way. They secured \$2,700 in the express car and a good deal of registered mail.

About 10 o'clock on the night of Sept. 24, five men boarded an Atchison, Topeka & Santa Fe train at Crowley, Tex. They also made the runner pull out a way and then cut off the engine, baggage, mail and express car and ran half a mile further. The booty secured seems to have been small, mostly Mexican silver.

##### Coupling Accident.

Assistant Editor—Here's an account of a minister assaulted by a disappointed lover while in the act of performing the marriage ceremony.

Chief—Put it in the railroad news.

Assistant (astonished)—Why?

Chief—He was hurt while making a coupling.—Epoch.

##### Compulsory Side Tracks.

The question of compulsory side tracks comes up occasionally. Such a case is that of W. P. Murray, who owns an elevator at Dawson, on the Minneapolis & St. Louis tracks. The Minnesota railroad commission decided that the Minneapolis & St. Louis should furnish a side track, and now the attorney-general affirms the legality of such decision on the ground that elevators once built are a public necessity and side tracks to them are equally necessary.

##### German Purchases of Lake Superior Mines.

It is said that the Blichroader syndicate has secured an option on the purchase of the Bessemer mine at Humboldt, and now holds the refusal of a number of the best non-Bessemer hematite mines on the Marquette range. The same syndicate has purchased the six principal mines on the Menominee range. It is said that \$4,000,000 have been invested in the Lake Superior region by this syndicate.

##### A Car Blessed.

The Pullman car which is to replace the one smashed in the Borke accident has just been inspected by the Czar and blessed by the head of the Greek Orthodox Church.

##### Russian Petroleum.

*Herapeth's* states that the price of kerosene at Batoum has lately risen 25 per cent., and still has an upward tendency, while the price of crude petroleum at the wells near Baku has at the same time advanced 100 per cent. The cause for the advance is that the estimated demand for the present year is 3,225,816 tons, and the estimated yield from the Baku wells is only 1,612,903 tons. In other words, it is thought that the wonderful yield of the wells on the shores of the Caspian is exhausting the pool, and unless new sources of petroleum are discovered exports must cease. It is also rumored that the Russian government is on the point of imposing a duty on petroleum exported to foreign countries, with a view of keeping the supply equal to the domestic demand.

##### Wheat Crop of the Canadian Northwest.

The Dominion government is taking every possible step to secure a fair estimate of the grain production of the Canadian Northwest this season, and it is announced that the surplus stock of wheat that will be required to move for export will be 12,000,000 bushels. The Canadian Pacific states that it has increased its rolling stock by 100 locomotives and 6,000 cars since 1887, during which year it will be remembered, they suffered a heavy blockade in moving the grain crop of Manitoba and the Northwest territory.

##### Railroad Thief Arrested.

Charles Williams has been lodged in the county prison at Norristown, Pa., to await trial on the charge of robbing freight cars on the Philadelphia & Reading Railroad. Williams

was arrested at Port Kennedy, where he was delivering stolen goods to Polish and Italian laborers at that point. The goods had been bought by the foreigners and were to be paid for on delivery. Detectives Hamlin and Samuel Cubler, of the railroad detective force, who have for a long time been after the pilferers of freight cars, made the arrest. Some of the articles found in Williams' possession were taken from a case of goods consigned to Comly Wright, in Norristown. The railroad has had about \$15,000 worth of goods stolen from the cars within a few months.

##### Railroad Circulating Libraries.

An English company is about to establish lending libraries on the Austrian railroads. Libraries will be established at all the railroad stations of any size, at which books will be loaned at a low rate. They can be returned at any of the libraries of the company. A good many railroad men think lending libraries would be very popular in this country, where, owing to long railroad distances, reading matter is much sought after.

##### The Metric System.

M. de Malarey recently submitted to the French Academy of Sciences statistics relative to the extent to which the metric system is now employed. The population of the countries using the system exclusively was, in 1887, 302,000,000. The countries in which the use of the system is optional—England and her colonies, excepting the East Indies, and the United States—counted 97,000,000. In Russia, Turkey and British India, where the system is legally recognized, the inhabitants numbered 395,000,000. These 794,000,000 constitute 61 per cent. of the civilized population of the world.

##### Imprisonment for Misplacing a Switch.

In Louisiana a negro boy, 15 years old, has been sentenced to 20 years in the penitentiary for misplacing a switch. This is the maximum penalty that can be imposed in that state for this offense, and in this special case it seems very severe, as there was nothing to show that the lad was vicious, and no harm was done. It is, however, most desirable that such offenses should be found out and severely punished in all cases.

##### Employees Censured.

The Vermont Board of Railroad Commissioners has made a report in the matter of the collision on the Central Vermont, near Brooksville, last August. A special train which was running between Burlington and Rutland collided with an extra live stock train of 21 cars. There was a serious wreck. The conductor and engineer of the passenger train were killed, the fireman of the stock train and a passenger were fatally injured, and several others more or less seriously. The Commission finds that the accident was the result of the grossest and most inexcusable carelessness on the part of Conductor Button and Engineer Chilson, of the stock train, who ran past New Haven on the time of the passenger train.

##### The Sault Ste. Marie Water Power.

The construction of the water-power canal at the Sault Ste. Marie has stopped for want of funds. It is said that \$200,000 has been invested so far. Efforts are making to secure the necessary capital to carry on the work.

##### Injunction Against the Removal of Railroad Shops.

The city of Corsicana, Tex., has secured an injunction preventing the Houston & Texas Central removing its roundhouse and shops from that city. The grounds upon which the injunction was obtained do not appear.

##### Iowa Railroad Law.

The State Farmers' Alliance, of Iowa, has addressed to the Republican candidates for Governor and Lieutenant-Governor questions concerning their attitude in the matter of the state railroad law. The candidates expressed themselves as in favor of an elective commission, of maintaining the present law, and of enlarging somewhat the powers of the commissioners.

##### Union Pacific Telegraph.

The United States Attorney at Omaha has filed a petition that the United States may intervene in the suit brought against the Union Pacific by the Western Union for exclusive right of way. The United States Government, it is claimed, should indirectly, through the increased earnings of the Union Pacific, have the benefit of the lease of the telegraph right of way to all telegraph companies, whereas now the Western Union have the right and pay nothing for it.

##### The Chinese Railroad.

Mr. Adolf Schwarz, a German engineer, has contributed to the *Wochenschrift des österr. Ingenieur und Architekten* a short article on the Chinese railroad. Some of the particulars have already been published, but, in connection with the additional matter, will bear repetition. The total length is about 63 miles. Part of the line is in good condition and boasts of considerable traffic, but the Tientsin-Tongku section was laid down very hurriedly so as not to postpone the fixed date of opening, and is accordingly in an unsatisfactory state. Vignol rails are used, weighing about 70 lbs. per yard, and are secured in the ordinary way to the ties. These are not impregnated, as it has been found that the native woods last very well without being treated by any of the preserving processes. The whole outfit is substantial and of the utmost possible simplicity. There is but a single track, excepting branches at the stations, and the gauge is 4 ft. 8 1/2 in. The bridges at Koton and over the Pehtang are worthy of mention. The cars are of American and English make. The trains are mixed and are made up as follows: Immediately behind the engine is a second-class car, divided longitudinally by a partition. Seats are arranged along both sides of the partition and the sides of the car. Following this is an open car, intended for workingmen and baggage; next in order come first-class cars of American pattern, fitted up almost luxuriously, and last are freight and platform cars. The train bands are Europeans: all other employees are natives.

There are no waiting rooms at any of the stations, even for first-class passengers, who are therefore compelled to await trains amid the throngs of exceedingly noisy natives. The whole distance, from end to end of the line, is covered in 5 1/2 hours, not counting a stop of half an hour at Tongku. This corresponds to a speed of about 18 miles per hour, which, for the present, is not to be exceeded. Besides Tongku, other important stations are Lutai, Tongfong, Suko Chinang, where there are repair shops and stock yards, and Tongshan, at which last place are located the offices, workshops and mines of the company. The rates of fare are very moderate, a first-class passage over the whole line costing 6 1/2 francs, or about \$1.30. The natives are not alarmed at what appears to them as a very high rate of speed, and travel by rail would seem to become very popular with them. Adding to this the fact that large quantities of coal, tiles and pottery are being carried, it seems fair to presume that the operation of the road will be profitable.

Considerable prejudice had to be overcome in building the

road, but the important advantages which it offers in an industrial sense are beginning to be generally appreciated, and it is not probable that the proposed extension of the line to Pekin will be seriously opposed by the Chinese government. It is intended that between 60 and 70 miles of this contemplated extension shall be completed before the end of the year.

#### RAILROAD LAW—NOTES OF DECISIONS.

##### Powers, Liabilities and Regulation of Railroads.

In Colorado, under the Union Pacific Railroad acts, the defendant railroad had a land grant from Kansas City to Cheyenne via Denver, and its road was in process of construction. The D. P. R. & T. Co. had graded a roadbed from Cheyenne to Denver. Subsequently, by act Cong. March 3, 1869, entitled "An act to authorize the transfer of lands granted to" defendant company, to the latter, defendant was authorized to contract with that company for the construction and operation of defendant's road between Denver and Cheyenne, and to grant to said D. P. R. & T. Co. the perpetual use of its right of way and depot grounds, and to transfer to it all the rights and privileges pertaining to that part of the road. The act further provided that "said companies are hereby authorized to mortgage their respective portions of said roads, as herein defined," for a certain amount per mile, "and each of said companies shall receive patents to the alternate sections of land along their respective lines of road," in the same manner as under the previous grant to defendant. The United States Circuit Court holds that, under the act of 1869, defendant's grant remained a continuous grant from Kansas City to Cheyenne, and the only effect of the act was to divide the grant between the two companies.<sup>1</sup>

A statute of Nebraska requires every railroad, within six months after its line of railroad or any part thereof is opened to erect and thereafter maintain fences on the sides thereof sufficient to prevent cattle, horses, sheep and hogs from getting on the track, except at the crossings of public roads and highways, and within the limits of towns, cities and villages etc. The Supreme Court rules that the provisions of Comp. St. c. 2, Art. 2, Sect. 18, defining "lawful fence," apply alone to the inclosing of lands, and such "lawful fence," if inadequate for the purposes specified in the former section, does not relieve the railroad from liability for stock killed.<sup>2</sup>

In Kentucky the Federal Court rules that when the charter of a railroad company provided that "railroads hereafter constructed may connect and join with the road hereby contemplated," the connection thus authorized is a physical and not a business connection, and it does not require an interchange of traffic at the point of junction.<sup>3</sup>

The Federal Circuit Court holds that under the Georgia code, which provides that the lessee of a railroad shall be liable to suit of any kind in the same court or jurisdiction as the lessor before the lease, service of summons in an action against a lesser railroad company by leaving a copy at the office of the superintendent in the county in which the declaration alleges the principal offices of the lessor and lessee were and are situate is good.<sup>4</sup>

In New York it is laid down that in reviewing proceedings under the New York "rapid transit act," the Court of Appeals will confine itself to the questions of law involved, and will not interfere with the determination of the Supreme Court as to the question whether the company needs the land proposed to be taken.<sup>5</sup>

The Supreme Court of Minnesota rules that the ordinance which limits the rate of speed of trains within the limits of the city of St. Paul to four miles an hour is not on its face so palpably unreasonable as to justify the court in setting it aside.<sup>6</sup>

The Federal Circuit Court in California decides that the congressional acts of 1862 and 1864, granting aid in the construction of a railroad and telegraph line to the Pacific Ocean, etc., operated as a present grant of land to the railroad company, upon conditions subsequent, which could only be defeated by breach of condition, and divestiture of title thereupon, by proper legal proceedings on behalf of the United States. The lands granted were the odd-numbered sections within 20 miles of the line of the road of such public lands as at the date of the act were not sold, reserved, or otherwise disposed of by the United States, and the odd-numbered sections within the same limits, if public lands, to which a pre-emption or homestead claim had not attached at the time the line of the road was definitely fixed. No right other than that of the railroad company could be acquired or initiated in any of said odd sections of land, after the filing in the local land office of the district, on Jan. 30, 1865, of the order of withdrawal provided for by act Congress July 1, 1862, § 7. The filing of the map of the general route and the withdrawal thereupon protected the lands against the acquisition of any right by any other parties until the line should become "definitely fixed," when the grant became specific by attaching itself to every odd section within the prescribed limits.<sup>7</sup>

##### Carriage of Goods and Injuries to Property.

The Supreme Court of Errors of Connecticut rules that a statute is not unconstitutional or void because opposed to natural justice in that it allows crossings, the necessity for which was created by the railroad, to be altered at the expense of the town.<sup>8</sup>

The Supreme Court of Kansas holds that an abutting lot-owner is not required or authorized on his own motion to enter on the alley, over which a railroad track is improperly constructed, for the purpose of changing the track, or repairing the alley, and thus lessen the injury and reduce the damages to which he is entitled by reason of such obstruction. The control of the alley is in the city.<sup>9</sup>

In Michigan the Supreme Court rules that the fact that a court refused to enjoin a railroad company from taking possession of land before condemnation and payment of compensation did not legalize the possession so taken nor relieve the company from an action at law for the wrongful entry.<sup>10</sup>

The Supreme Court of New York decides that the duty imposed on a railroad by the laws of 1850 c. 140, to restore a highway intersected by its road "to its former state, or to such state as not unnecessarily to have impaired its usefulness," is a continuous one, and whenever, by an increase of business on a highway, the facilities first provided by the company become inadequate, it must make such changes as may be reasonably necessary.<sup>11</sup>

In Pennsylvania, the Supreme Court holds that a railroad cannot build its track on a street which has been laid out, but not opened, until compensation, as required by Const. Pa., art. 16, § 8, has been made to the owners of the land on which the street is located; and it is immaterial that the assent of the city has been obtained, and that the railroad company has given bond to protect the city.<sup>12</sup>

In Pennsylvania, the Supreme Court rules that in an action for damages for taking land the lapse of time between the entry and the trial is proper for consideration on the question of damages, but interest as such is not recoverable.<sup>13</sup>

In Iowa, in a similar action, it is held that the railroad can make the defense that the right of way was acquired

and paid for by another company, whose rights defendant has acquired under foreclosure of a mechanic's lien; that plaintiff's claim is barred by limitation, and that he is estopped to deny defendant's right of occupancy. Hence it cannot on any of these grounds enjoin the *ad quod damnum* proceedings.<sup>14</sup>

The Supreme Court of Wisconsin rules that under the statute authorizing counties to pay their subscriptions to railroad stock in "money, lands, or other property, instead of by the issue of bonds," they may be paid in tax certificates.<sup>15</sup>

##### Injuries to Passengers, Employees and Strangers.

In Indiana the plaintiff went on a train to assist in placing an invalid in one of the cars; he did so at the request of the invalid's family; plaintiff knew that the train was in motion when he attempted to leave it; the train was then moving at the rate of 4½ miles per hour, and the conductor knew that plaintiff was on the train when it started, and that he intended leaving it, but he did not know plaintiff was on the steps of the car, or in the act of alighting at the time he did. The Supreme Court rules that the plaintiff rightfully entered the car, and that defendant owed him the same duties while rendering such assistance and while leaving the car as it owed its passengers, and a judgment against the railroad is affirmed.<sup>16</sup>

The Supreme Court of Indiana holds that a passenger, being required to leave the train to avoid forcible expulsion, and to pay his fare (25 cents) in order to continue his journey, is entitled to recover for the humiliation, disgrace and injury to his feelings consequent upon his treatment, which is an act of oppression, and a judgment for \$200 is not excessive.<sup>17</sup>

In New York, the Court of Appeals rules that one's right to recover for an injury to an intestate resulting in his death is not defeated by the fact that he rejected the advice of his physician, and refused to submit his injured leg to amputation; the physician testifying that such an operation would merely "have improved the chances" of recovery.

The Supreme Court of Washington Territory decides that where, by the rules of a railroad company, trains are to be run under the direction of the conductor, except when such direction conflicts with the rules, or involves hazard, when the engineer is equally responsible, the conductor and engineer of a train are not fellow-servants, or engaged in the same common employment, with a laborer engaged in "surfacing" the track.<sup>18</sup>

In California the Supreme Court decides that a laborer employed by a railroad to remove snow and other obstructions is a fellow-servant with the track-walker, whose duty it is to see that the track is clear, and with a conductor of a train.<sup>19</sup>

In Illinois the Supreme Court holds that the question whether a section hand engaged in loading iron on a car was, at the time of the accident, a fellow-servant with those in charge of the train which ran over him, and on which he had ridden to his work, was one of fact and not for the court, and a finding that they were not fellow-servants was warranted by the evidence.<sup>20</sup>

The Court of Appeals of New York decides that a railroad which has provided a proper car for loading, and competent servants for the inspection of loaded cars before they are taken out, is not liable for an injury to a servant employed on its train, caused by the improper manner in which the car is loaded, as such injury is the result of the negligence of the servants whose duty it is to inspect cars, and they are fellow-servants of the injured person. It is immaterial that the car was loaded by servants of the shipper, and in such a manner as to render an appliance on the car useless, where the car as originally provided was in a safe and proper condition.<sup>21</sup>

<sup>1</sup> U. S. v. U. P. R. Co., 37 Fed. Rep., 551.

<sup>2</sup> C. B. & Q. R. Co. v. James, 41 N. W. Rep., 992.

<sup>3</sup> K. & I. Bridge Co. v. L. & N. R. Co., 37 Fed. Rep., 567.

<sup>4</sup> Hills v. R. & D. R. Co., 37 Fed. Rep., 660.

<sup>5</sup> re Union El. R. Co., 21 N. E. Rep., 81.

<sup>6</sup> Weyl v. C. M. & St. P. R. Co., 42 N. W. Rep., 24.

<sup>7</sup> U. S. v. Cantner, 38 Fed. Rep., 1.

<sup>8</sup> Appeal of Westbrook, 17 Atl. Rep., 368.

<sup>9</sup> Cent. Branch U. P. R. Co. v. Andrews, 21 Pac. Rep., 276.

<sup>10</sup> G. R. L. & D. R. Co. v. Chesebrough, 42 N. W. Rep., 66.

<sup>11</sup> Hatch v. S. B. & N. Y. R. Co., 4 N. Y. (Supp.), 509.

<sup>12</sup> Beidlers Appeal, 17 Atl. Rep., 244.

<sup>13</sup> R. & P. R. Co. v. Baltzshaser, 17 Atl. Rep., 518.

<sup>14</sup> K. & N. W. R. Co. v. Donnell, 42 N. W. Rep., 176.

<sup>15</sup> Hall v. Baker, 42 N. W. Rep., 104.

<sup>16</sup> L. & W. Co. v. Crunk, 21 N. E. Rep., 31.

<sup>17</sup> C. St. L. P. R. Co. v. Holdridge, 29 N. E. Rep., 837.

<sup>18</sup> Sullivan v. Tioga R. Co., 20 N. E. Rep., 569.

<sup>19</sup> N. P. R. Co. v. O'Brien, 21 Pac. Rep., 32.

<sup>20</sup> Fagundes v. C. P. R. Co., 21 Pac. Rep., 437.

<sup>21</sup> C. & A. R. Co. v. Kelly, 21 N. E. Rep., 203.

<sup>22</sup> Byrnes v. N. Y., L. E. & W. R. Co., 21 N. E. Rep., 50.

#### General Railroad News.

##### MEETINGS AND ANNOUNCEMENTS.

###### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

*Cleveland, Cincinnati, Chicago & St. Louis*, 1½ per cent. on preferred stock, payable Oct. 1.

*Evansville & Terre Haute*, quarterly, 1½ per cent., payable Oct. 21.

*New York Central & Hudson River*, quarterly, 1 per cent., payable Oct. 15.

*New York & New England*, 5½ per cent., on the preferred stock, payable Nov. 1.

*New York, New Haven & Hartford*, quarterly, 2½ per cent., payable Oct. 1.

###### Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Cleveland, Cincinnati, Chicago & St. Louis*, annual, Cincinnati, Oct. 30.

*Cincinnati, Jackson & Mackinaw*, annual, Van Wert, Ohio, Oct. 2, at 1 p. m.

*Evansville & Terre Haute*, annual, Evansville, Ind., Oct. 21.

*Hereford*, special, Cookshire, P. Que., Sept. 30, for the purpose of acting upon a proposed mortgage.

*Hudson Tunnel Railway Co.*, annual, New York City, Oct. 1, at 12 noon.

*Knoxville Belt*, special meeting at Knoxville, Tenn., Nov. 2, for the purpose of acting upon a proposed mortgage.

*Lake Erie & Western*, annual, at Bloomington, Ill., Oct. 2.

*Louisville & Nashville*, annual, at Louisville, Ky., Oct. 2.

Transfer books close Sept. 19 and re-open Oct. 3.

*Louisville, New Orleans & Texas*, annual, 39 South Court street, Memphis, Tenn., Oct. 7 at 11 a. m.

*Northern Pacific*, annual meeting of stockholders and special meeting of the preferred stockholders, Oct. 17.

Transfer books close Sept. 16, and remain closed until Oct. 18.

*Ohio & Mississippi*, annual, at Cincinnati, O., Oct. 10, 10 a. m.

*Oregon & Transcontinental Co.*, special meeting, Portland, Or., Nov. 5, to take action on the question, which has already been submitted to the directors, whether the capital of the company shall be reduced or the company shall be liquidated and go out of existence.

###### Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *General Time Convention* holds its fall meeting at Hotel Brunswick, New York City, Oct. 9, at 11 a. m.

The *Association of North American Railroad Superintendents* will hold its eighteenth annual meeting at the Hotel Brunswick, New York City, Oct. 7.

The *Association of Railway Telegraph Superintendents* will hold its eighth annual meeting at Washington, D. C., Oct. 11.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds its regular meeting on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at the Club rooms, No. 24 West Fourth street, Cincinnati, at 8 p. m., on the fourth Thursday of each month.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Club of Wichita* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

###### American Association of General Passenger and Ticket Agents.

At the recent meeting of this association, at Atlanta, 27 members were present. The total membership is 153.

The city of Mexico was chosen as the place of the next spring meeting.

The subject of coupon tickets was not discussed. Mr. McCoy stated that he was a member of the Association of Accounting Officers; that, as an accountant, he saw very little use of such tickets, and, as a General Passenger Agent, he saw much less.

The secretary was instructed to correspond with the chairmen of all traffic associations on the subject of the transportation of dogs in crates, presenting such facts as may be obtainable, and requesting them to arrange with each other for the adoption of some uniform rule that will keep the matter within reasonable bounds. The following resolution was adopted: That it is the sense of this association that the so-called harvest excursions are injurious to our business, and that we pledge ourselves to discourage them in every possible way, and that the secretary be instructed to send a copy of this resolution to all traffic associations.

The following telegram was submitted by the secretary:

MILWAUKEE, Wis., Sept. 17, 1889.

Hearty greeting to all of you. May the unanimity and fortitude with which the rates during the G. A. R. encampment were maintained be an incentive to a long pull, a strong pull, and a pull altogether to bring the railways of the country through their struggles with the balance on the right side of their ledgers. A. V. H. CARPENTER.

Resolutions on the death of Mr. L. M. Cole, of the Baily & Ohio, were adopted.

###### American Institute of Mining Engineers.

The fifty-fifth meeting of the Institute, which opens at Ottawa, Ontario, on Tuesday, Oct. 1, promises to be interesting. At a meeting of the citizens, held at Ottawa on Friday last, a number of changes were made in the original programme as published in the *Railroad Gazette*, Aug. 30.

The programme of the meeting has been arranged as follows: Tuesday, opening session in the evening in the railway committee room of the Dom non Parliament. Wednesday, morning session. Afternoon, drives to the saw-mills, experimental farm, Rideau Hall, and other points of interest. Thursday, morning and afternoon session. Friday the phosphate mines on the Du Lievre will be visited. The members will be taken through to Buckingham village by special train on the Canadian Pacific. The mine owners and managers have made arrangements to take the delegates by steamer to Little Rapids, where lunch will be served. The mines there will be visited, and those desiring to go further up the river and inspect the other phosphate mines will be provided with good accommodation over night. The others may return to Ottawa the same night. Saturday the excursion for Sudbury copper mines, Port Arthur, etc., will leave by the Canadian Pacific, the railway and Pullman fares being provided from the grant by the Ontario government. The excursionists will have the exclusive use of a Pullman car on the trip. They will reach Sudbury Sunday morning, remaining until Monday, and after inspecting the extensive mines and smelting works of the Canada Copper Co. a start will be made for Port Arthur, which will be reached on Wednesday afternoon. The Mayor and Council of that town will tender a reception to the visitors, and will also make special arrangements to drive the excursionists to the Beaver Silver Mountain and other silver mines. Every facility will be afforded for the inspection of this famous mineral district. Most of the excursionists will return to Ottawa. It is calculated that the trip will last about ten days.

Saturday, another section of the delegates will leave by the Canada Atlantic Railway for the eastern townships. The Quebec Central will run a special to take the excursionists to the asbestos, copper and other mines in that locality. The mine owners and managers will provide lunch at Black Lake and show the attractions. During the meeting over a dozen papers treating on Canadian mines and minerals will be read.

**Association of North American Railroad Superintendents.**

The eighteenth meeting of the Association will be held at the Hotel Brunswick, Fifth avenue and 26th street, New York City, on Monday, Oct. 7, 1889, at 11 a. m.

The following reports will be read:

Report of Executive Committee, President Gadsden, Chairman.

Report of Committee on Roadway, J. B. Morford, Chairman.

(a) On Award of Prize for best Treatise on Trackwork, etc.

(b) On Rail Sections.

Report of Committee on Machinery, G. W. Beach, Chairman.

(a) On Steam-heating of Trains.

(b) On Train-Signal Apparatus.

Report of Committee on Transportation, Robt. Blee, Chairman.

(a) On Uniform Forms for Time-Tables.

(b) On Methods of Discipline.

Report of Special Committee on Rooms and Headquarters, C. W. Bradley, acting Chairman.

Report of Special Committee on Relations with General Time Convention, President Gadsden, Chairman, *ex officio*.

The questions whether the association shall adopt the amended form of constitution proposed at the last meeting, and whether it shall establish formal relations with other organizations of railroad men, will come up for consideration.

A full attendance is requested, and the secretary extends a cordial invitation to all railroad superintendents, past or present, to attend this meeting, and, if not members, to present their applications for membership.

**Engineers' Club of Kansas City.**

A regular meeting was held Sept. 7 at Wallula by invitation of Mr. H. A. Keefer, Vice-President Breithaupt in the chair. It was voted to appoint a committee to confer with a committee of the American Society of Civil Engineers, and similar local committees, with reference to a closer affiliation among the various engineering societies.

Resolutions of respect were read and adopted appropriate to the death of Mr. Eugene J. Remillon, member of the club.

A paper on Water Gas was read by Mr. A. G. Glasgow, and a paper on the Early Manufacture of Iron, by Mr. H. A. Keefer. Names of candidates for membership were proposed and the business meeting then adjourned. The club was entertained by Mr. and Mrs. Keefer with a luncheon and lawn party.

**PERSONAL.**

—Mr. Robert Laughlin, Superintendent of the Saginaw, Tuscola & Huron road, has tendered his resignation.

—Mr. William B. Strong, ex-President of the Atchison, Topeka & Santa Fe, is reported to have accepted the presidency of the Missouri Pacific.

The directors of the Atchison, Topeka & Santa Fe have chosen the General Auditor, Joseph W. Reinhardt, fourth Vice-President, with control of the Boston office.

—Mr. Angus Sinclair, Secretary Master Mechanics' Association, and editor *National Car and Locomotive Builder*, will sail for Europe, Sept. 25, to be gone seven weeks.

—Mr. Richard P. Rothwell, Editor of the *Engineering and Mining Journal*, has been appointed special agent in charge of the collection of statistics of gold and silver for the eleventh census.

—Mr. L. G. Sporlein, Assistant Freight Auditor of the Illinois Central road, died very suddenly last week of diphtheria. Mr. Sporlein was Car Accountant of the road for ten years before becoming Assistant Freight Auditor.

—Mr. Edward F. Winslow, President of the St. Louis & San Francisco, has sailed for Europe. As Mr. Winslow expects to remain abroad for a long time, Mr. T. W. Lillie, Secretary and Treasurer, has been chosen Acting President until Mr. Winslow returns.

—Mr. Cecil Gabbett, now General Manager of the Western of Alabama, the Cincinnati, Selma & Mobile, and the Atlanta & West Point roads, has been chosen General Manager of the Central of Georgia to succeed Mr. Belknap. Mr. Gabbett entered railroad service in June, 1869, as civil engineer on the Midland Great Western of Ireland. In 1870 he came to this country and has since been engineer on the Vicksburg & Brunswick; engineer on Southwestern of Georgia; civil engineer of the United States Engineer Corps from 1872 to 1877; Engineer of Bridges of the Western of Alabama; Roadmaster of the same road, and in 1878 General Manager. In 1881 he became General Manager of the Western of Alabama, and in 1886 General Manager of the Cincinnati, Selma & Mobile.

—Major M. S. Belknap has resigned the position of General Manager of the Central Railroad of Georgia to accept the position of President of a bank in the City of Mexico. Major Belknap has been General Manager of this road since March 1, 1887. He was born in New Orleans in 1845, and graduated as a Civil Engineer, in Paris. He entered railroad service in 1869 in the engineering department of the Louisville & Nashville. Between 1874 and 1879 he was engaged in various enterprises. Since then he has been Engineer and Superintendent of the Mexican Central, Superintendent of the Mobile & Montgomery Division of the Louisville & Nashville, from 1880 to 1885; Superintendent of the Vicksburg & Meridian and Vicksburg, Shreveport & Pacific for two years. In January, 1887, he became General Superintendent of the Central of Georgia, and General Manager two months later.

**ELECTIONS AND APPOINTMENTS.**

**Atlantic & North Carolina.**—The following new directors have been elected: W. S. Chadwick, of Beaufort, N. C.; T. D. Webb, of Carteret; W. G. Brinson, of Craven; P. M. Pearall, of Jones; Dempsey Webb and A. C. Davis, of Lenoir; W. T. Caho, of Pamlico; Charles Dewey, of Wayne. W. S. Chadwick was elected President, to succeed Washington Bryan.

**Birmingham, Jackson & Kansas City.**—The following board of directors has been elected: Col. Clifton Dancy, Robert Gates, W. A. Taylor, J. W. Burkett, S. D. Hays, W. D. Deupree and P. J. Murray. A meeting of the board of directors was held, and the following officers elected: Col. Clifton Dancy, President; Robert Gates, First Vice-President; W. A. Taylor, Second Vice-President; J. W. N. Burkett, Secretary and Treasurer, and S. D. Hays, Attorney.

**Brighton Beach.**—The following have been elected directors of the company for the ensuing year: William Marshall, A. S. Robbins, U. A. Murdock, A. B. Baylis, George I. Murphy and James Jourdan.

**Camden County.**—The directors of this New Jersey road are: A. A. McLeod, S. Garwood, W. Taylor, F. R. Brace, M. D. Sarfaty, S. Davis and E. C. Wilson.

**Chicago, St. Paul & Kansas City.**—J. A. Granger has been appointed Ohio Passenger Agent of this company, with headquarters at Columbus, O.

**Chicago & West Michigan.**—Thomas Butterworth has been appointed Master Mechanic, with headquarters at Muskegon, Mich.

**Denver & Rio Grande.**—A. C. Ridgway, Chief Clerk in the office of the Superintendent of the Third Division in Salida, Col., has been appointed Assistant Superintendent of the Second and Third Divisions of the Denver & Rio Grande, with headquarters in Salida.

**Detroit, Lansing & Northern.**—George A. O'Keefe, formerly Foreman of Repair Shops, has been appointed Master Mechanic, with office in Ionia, Mich. His authority also extends over the Saginaw & St. Louis road.

**Evansville, Suburban & Newburg.**—At a recent meeting of the directors of the company, at Evansville, Capt. Lee Howell, the President, tendered his resignation, and Hon. F. W. Cook was elected to fill the vacancy. All the other officers were re-elected.

**Galveston, Harrisburg & San Antonio.**—The appointment of William Maul as assistant to the president of the Galveston, Harrisburg & San Antonio, Texas & New Orleans and Louisiana Western railroads has been announced.

**Homestead Connecting.**—The following are the directors of this new Pennsylvania company. Charles E. Speer, President; Charles E. Speer, Ira W. Birchfield, E. M. O'Neill, Harry Brown, Geo. C. Burgin, all of Pittsburgh, and James S. Kuhn, of McKeesport, Pa.

**Houston & Texas Central.**—H. A. Jones has been appointed Assistant Freight Agent, with headquarters at Houston, Tex.

**Illinois Central.**—A. W. Sullivan, Superintendent of the lines in Illinois, becomes Acting Superintendent of the system, vice C. A. Beck, promoted to be Acting General Manager. E. G. Russell, Superintendent of the Wisconsin Division, has been made Superintendent also of the Illinois lines.

**Joliet & Blue Island.**—The incorporators and first board of directors of this Illinois company are Adams A. Goodrich, of Jerseyville; Frank H. McCulloch, Frank H. Bowen, Harry P. Young and James C. Hutchins, of Chicago.

**Kentucky Union.**—T. B. Slade has been appointed Superintendent of this company, and J. M. Carr, Master Mechanic.

**Los Angeles & Pacific.**—Charles Prudhomme has been appointed Superintendent for the Receiver.

**Minneapolis, St. Paul & Sault Ste Marie.**—The annual meeting was held in St. Paul last week when the board of directors was reduced from 13 to 7. The following were elected: Thomas Lowry, R. B. Langdon, J. S. Pillsbury, W. D. Washburn, John Martin, H. E. Fletcher and C. H. Pettit. The deposed directors are J. C. Oswald, C. C. Merriman, C. J. Martin, M. B. Koon, C. W. Herrick and A. H. Linton. T. Lowry was elected President, to succeed the Hon. W. D. Washburn.

**Missouri, Kansas & Texas.**—The following appointments have been announced: W. G. Graham, Assistant General Passenger & Ticket Agent at Sedalia, in charge of business north of Denison, Tex. H. P. Hughes, Assistant General Passenger Agent in charge of the local business in Texas, with headquarters at Fort Worth, Tex.

**Nashville, Chattanooga & St. Louis.**—Mr. J. W. Thomas, Jr., has been appointed Assistant General Manager, with charge of the purchase of supplies. His office will be in Knoxville.

**Plant Steamship Line.**—The position of Passenger Agent of the Plant Steamship Line having been abolished, Mr. C. E. Fusté has been promoted to the position of General Traveling Agent, and will represent the traffic interests of the line in foreign countries.

**Rochester & St. Paul.**—The names and address of the incorporators of this Minnesota company are as follows: Raymond du Puy, C. W. Benson, Joel May, C. E. Marvin and R. C. Wright, all of St. Paul, and W. W. Mayo and A. Nelson, of Rochester, Minn.

**St. Johnsbury & Lake Champlain.**—The annual meeting of the stockholders of the road, was held at St. Johnsbury, Vt., recently, and the following were chosen directors: Geo. W. Hendee, of Morrisville; S. C. Shurtliff, of Montpelier; H. E. Folsom, of Lyndonville; Carroll S. Page, of Hyde Park; George C. Lord, Samuel C. Lawrence, C. E. A. Bartlett, W. T. Hart, all of Boston, and Franklin Fairbanks, of St. Johnsbury. The directors organized with C. E. A. Bartlett as President and W. F. Morse, of Montpelier, Secretary and Treasurer.

**St. Louis & San Francisco.**—The directors have elected T. W. Lillie, Secretary and Treasurer, Acting President during the absence of President E. F. Winslow in Europe.

**St. Paul, Minneapolis & Manitoba.**—The newly-elected directors of the road organized this week, and elected the old officers, with the exception of the Vice President, Sir Donald A. Smith being chosen to fill the vacancy caused by the resignation of Allen Manvel. The new directors are William Minot, Jr., and John H. Sterling.

**Seaboard.**—Henry D. Haven and Willis J. Best, of New York City; Edward Q. Upham and Robert Middleton, of Mobile, Ala.; Horace C. Burrows, of Tarrytown, N. Y., and Erastus H. Barnes and Frank Budd, of Brooklyn, N. Y., are named as incorporators in the charter filed in Alabama.

**Washington & Idaho.**—Geo. W. Truax, Julius Galland, C. J. Smith, Isaac Cooper, W. N. Walker, W. H. Halcomb and Theodore Galland are named as trustees in the charter filed in Montana. George W. Truax is President and Julius Galland is Secretary.

**OLD AND NEW ROADS.**

**Alabama Midland.**—This road has been opened for traffic from Bainbridge, Ga., to Ozark, Ala. Construction is being pushed from Ozark to Troy, and it is expected that the road will be completed between these points within four months.

**Astoria & South Coast.**—Twenty car loads of rails for this road have arrived at Skipanon, Wash. Ter. The grading is now completed on the 18 miles from Skipanon, opposite Astoria, to Ocean Side House. Grading has been commenced for a branch to the Willamette Valley Junction, from a point on the main line, 11 miles from Skipanon.

Moses Langtry has accepted a contract with this company to clear 40 miles of the right of way. Tie contracts are also being let, and grading will be pushed along as rapidly as the clearing of the right of way can be accomplished. The people of Hillsboro, Washington County, Or., are anxious to have the line extended to that town. They have been asked for a subsidy by the company, consisting of \$15,000 in cash, a right of way 60 ft. wide through the town, and 20 acres of land for station purposes.

**Boston, Revere Beach & Lynn.**—At the special meeting of stockholders of the Boston, Revere Beach & Lynn, held last week, an increase of \$150,000 in capital stock was voted. The amount received by the sale of this new stock will be used to pay off the floating debt of the company, which is about \$250,000. The directors have not yet decided how the new stock is to be disposed of.

**Burlington & Missouri River.**—The Attorney-General of Nebraska has begun quo warranto proceedings in the Supreme Court to forfeit the franchise of the Frenchman Valley line of the Burlington & Missouri River, which extends from Culbertson, Neb., on the Denver line to Holyoke, Col., on the Cheyenne line. The charter for this road was granted some four or five years ago and the grading done over two years ago. The company has, however, let a contract to Richardson & Doty, of Hastings, Neb., to complete the line, and tracklaying will begin immediately.

**Camden County.**—This company has been incorporated at Trenton, N. J., to run from Blackwood to Spring Mill. It will be a branch of the Camden, Gloucester & Mt. Ephraim division of the Atlantic City road. This is the completion of a scheme for the extension of the Camden, Gloucester & Mt. Ephraim, in the belief that it would benefit the latter road, which now hardly pays fixed charges.

**Camden, Rockland & Rockport.**—The Railroad Commissioners of Maine have revived the charter of this company, which had expired. The company proposes to build from Rockland to Camden, Me., about nine miles.

**Calumet & Blue Island.**—The company has filed articles of incorporation in Illinois. This line is to be constructed from a designated terminus in the city of Chicago to the village of Blue Island. The capital stock is \$200,000. The principal office is to be maintained at Chicago, and the incorporators and first board of directors are the same as for the Joliet & Blue Island and Chicago & Kenesha roads.

**Cape Fear & Yadkin Valley.**—Tracklaying has been completed from Wilmington, N. C., for a distance of 16 miles, to a point called Moor's Creek. The bridge over Black River, 15 miles beyond Moor's Creek, is completed, and work will not be delayed by it. W. P. Fortune, of Wilmington, has the contract between Wilmington and the Black River.

**Catawissa.**—The Philadelphia & Reading has filed its answer to the suit brought against it by this company. The complaint is that the Philadelphia & Reading has violated the agreement of the lease by diverting traffic from the Catawissa road to the Shamokin, Sunbury & Lewisburg, which also is under the control of the Philadelphia & Reading. The court was asked to order that, as the Shamokin, Sunbury & Lewisburg is a parallel and competing road with that of the Catawissa, the lease of the former road was void, because it was a violation of the Constitution. The answer of the Reading denies that the Shamokin, Sunbury & Lewisburg is a parallel or competing line with the Catawissa Railroad, and it is claimed that the provisions of the State Constitution have no application to the case in hand. It is denied that traffic has been diverted from the Catawissa Railroad as alleged.

**Charleston, Cincinnati & Chicago.**—A syndicate of New York & Philadelphia capitalists has completed a negotiation for the purchase of \$6,000,000 of the first-mortgage bonds of the Massachusetts & Southern Construction Co., which is building the Charleston, Cincinnati & Chicago Railroad. The line is now built from Camden, S. C., to Rutherford, N. C., and 200 miles have been put under contract to be constructed within a year. The remainder of the line, to the Ohio River, will be built as fast as arrangements can be made. The road already connects with the East Tennessee, Virginia & Georgia at Carnegie and will intersect the Norfolk & Western at the new town of Minneapolis, Va. It runs through fine mineral and timber sections of the South.

McDonald, Shea & Co., of Knoxville, have let sub-contracts for grading and masonry to P. F. Cogan (5 miles), S. D. Dunnavant, Goodman & Foster, W. McD. Burgin, N. G. Scott, J. C. Sullivan and F. C. Ingleside & Co. L. C. Gold has the contract for cattle guards and trestles.

**Chicago, Burlington & Quincy.**—It is stated that the company has awarded the contract for the construction of a branch road from Cheyenne, Wyo., to the Elk mountain coal fields, to Kilpatrick Bros. & Collins, of Beatrice, Neb. This will give the road direct communication with a country abounding in coal.

**Chicago & Kenesha.**—Articles of incorporation have been filed in Illinois. The road is to be constructed from a designated terminus in the city of Chicago to a point on the Illinois State line in the county of Lake. The capital stock is \$100,000, and the principal office will be at Chicago. The incorporators and first board of directors are the same as for the Joliet & Blue Island and Calumet & Blue Island roads.

**Chicago & Northwestern.**—It is said that Robinson, Sang & Co. have secured a contract to build a branch from Beechwood to Iron River, Minn. It is also stated that the company will build from Kasson to Mantorville, Minn.

**Chicago, St. Paul & Kansas City.**—A circular has been issued in London by Robert Benson & Co., and in Amsterdam by Hope & Co., to holders of Minnesota & Northwestern five per cent, first-mortgage bonds and Chicago, St. Paul & Kansas City five per cent, first-mortgage bonds, inviting them to unite in a plan to fund the six next maturing coupons and to accept a five per cent, sterling priority loan bond maturing 1934, if not previously redeemed on six months' notice at 105, the company binding itself not to pay any interest on the income bonds or dividends on the stock until the priority loan is fully paid off. The firms referred to have agreed to furnish a considerable sum of money, enough to complete the system and make various improvements.

**Chicago, St. Paul, Minneapolis & Omaha.**—The Supreme Court of Nebraska has rendered a decision in accordance with stipulations on file forfeiting the franchise of the road from Niobrara to Atkinson. The charter was granted some eight years ago, but aside from the surveys and some little grading nothing has been done by the company to improve its rights.

**Cincinnati, Jackson & Mackinaw.**—A meeting of the stockholders will be held Oct. 2, to vote on the proposition to build an extension from Addison to Jackson, Mich., and also from Battle Creek to Lowell, Mich. A proposition to issue a mortgage of not more than \$3,000,000 for building the extensions, buying new rolling stock and making improvements, will be voted upon at the same time.

**Cincinnati, Washington & Baltimore.**—The postponed judicial sale on foreclosure of the road was held this week at Cincinnati, and the road sold to E. R. Bacon for \$5,000,000. Mr. Bacon was Vice-President of the road before it went into the hands of receivers, and represents the bondholders and stockholders in this country and England. The sale is the result of an agreement between the bondholders and stockholders of the old company, Mr. Bacon,

who represents the purchasing committee, says that there will be an issue of \$11,000,000 4½ per cent. bonds, guaranteed for 100 years by the Baltimore & Ohio; an issue of \$5,500,000 first income bonds, \$6,400,000 in second income bonds, \$7,700,000 third income bonds, all at 5 per cent., an issue of \$2,500,000 in preferred stock and \$2,500,000 common stock. The holders of the preferred and common stock will operate the road.

**Darien Short Line.**—The President of the road, R. K. Walker, of Darien, Ga., will soon arrive in New York to purchase the rails to complete the line and also to make arrangements for furnishing the rolling stock. Over 40 miles of grading has been completed and cross ties are now being laid between Darien and Josephine.

**Decatur, Chesapeake & New Orleans.**—Work has been suspended on this road until some agreement has been reached with the county officers regarding the \$150,000 which was voted by Lincoln County to the railroad company if the road was completed by Sept. 10.

The line is now being located north to Shelbyville, Tenn., and south to Decatur, Ala. It is expected to let the contracts for building this part of the line this fall.

**Delaware River & Lancaster.**—H. R. M. Whitman is making a survey of the route from Falls of French Creek to Lancaster for the road. The proposed route passes through the villages of St. Marys and Springfield, in Chester County; Morgantown, Berks County, and Churchtown, Lancaster County, Pa.

**Dexter & Ontario.**—The map and profile of the road, to be built from Dexter to a port on the Cape Vincent Branch of the Rome, Watertown & Ogdensburg, all in Jefferson County, N. Y., have been filed with the County Clerk. The road will be about two miles in length. J. A. Outer-son is President and J. L. Newton Secretary.

**Diamond Valley.**—The line was formally opened to passenger traffic Sept. 15. The road connects with the Pennsylvania at Barre, Pa., and traverses a valley rich in timber and iron ore a distance of 14 miles to West Mooresville Station.

**Duluth & Winnipeg.**—Grading has been commenced on the section between the end of the track, 20 miles north of Cloquet, Minn., and the Mississippi River. The contractors, Foley Bros., have about 2,000 men at work.

**Ellensburg & Northeastern.**—Ten miles of the grading on this road toward the Conconully region, Washington Territory, have been completed. Eighty teams are employed on the work.

**Farmville & Powhatan.**—A force of about 80 men is laying the track between Summit and Powhatan, Va., 65 miles. Tracklaying was commenced last June, and since then 26 miles of track have been laid.

**Genesis & Obed River.**—The contracts will be let about Jan. 1 for building the section between Pilot Mountain and Lavender, Tenn., 10 miles. The contracts were to have been awarded Oct. 1, but the officers now announce that they will be let about Jan. 1.

**Georgia Pacific.**—Gibson & Corpening, of Birmingham, Ala., have been awarded a contract for building 40 miles of new road commencing at Itabena, Miss., near Greenwood, through the Yazoo Valley, toward Memphis.

**Great Northwest Central.**—It is stated now that the directors have succeeded in making financial arrangements in England, and that the first 50 miles of the road will be completed before next spring. These arrangements represent a subscription of \$10,000,000 by English capitalists. Rails for the 50 miles are now landing at Montreal. Work over the whole line will be started immediately, for which tenders will be invited. The proposed line extends from Brandon, Manitoba, to Battleford, Northwest Territories, a distance of 450 miles. Toward the construction of this line the Dominion Parliament in 1886 ratified an allotment of 2,880,000 acres of land as a subsidy at the rate of 6,400 acres per mile. Among the directors are Senator Clemow, Ottawa, President; Alphonse Charlebois, Quebec; Capt. Murray, St. Catharines, Ont., and Messrs. Alien and Devlin, Ottawa.

**Green Bay, Winona & St. Paul.**—The company announces that it has received assent from holders of nearly 9,500,000 of stock approving the reorganization plan. A 10 per cent assessment will be made on income roads, and five per cent on stock, realizing \$878,100, \$726,100 of which will go to the Winona & Southwestern, which is to build the extension southwest.

**Hanford.**—A meeting of stockholders will be held at Cookshire, P. Q., Sept. 30, when they will vote on a proposition to lease the railroad of the Dominion Lime Co.; and they will also vote whether to issue bonds at the rate of \$15,000 per mile. The Dominion Parliament, in 1886, granted a subsidy of \$168,500 on the 34 miles between Hereford and the International road at Eaton. At the last session of Parliament a further grant of \$48,000 was made to extend the line from Cookshire to extensive lime deposits near Dodswell.

The board of directors has issued a call of stockholders to pay in 70 per cent. of the amount of the capital stock of the company subscribed by them, to be payable Oct. 16 at Cookshire, P. Q.

**Homestead Connecting.**—This company has filed articles of incorporation in Pennsylvania to build a road to extend from a point at or near Bouquet street, in the city of Pittsburgh, near its intersection with Atwood street, to the Borough of Homestead, on the south bank of the Monongahela River, the route being wholly within the county of Allegheny. The length of road will be about four miles. The capital stock will be \$40,000.

**Interocanic.**—On Sept. 15 the Eastern or Gulf Division (hitherto known as the Iroquois line) was opened for freight traffic between the City of Mexico and Perote, and the so-called Morelos line or Pacific portion of the Interocanic system was on the same day opened for freight business as far as Tlalizapan. The town of Perote is in the state of Vera Cruz and is only about 30 kilometers east of Jalapa; the line to Perote passes through Puebla and other commercial places of importance. Tlalizapan is in the state of Morelos and is about 10 kilometers north of the rice-growing region of Jojutla.

**Joliet & Blue Island.**—Articles of incorporation filed in Illinois to build a road from a point at or near the city of Joliet to a point at or near the village of Blue Island, in Cook County. The capital stock is \$100,000 and the principal office is to be maintained at Chicago. The incorporators of this company are also incorporators of the Calumet & Blue Island and Chicago & Kenesha roads, just chartered.

**Kalamazoo & White Pigeon.**—The directors of the road, a proprietary line of Lake Shore & Michigan Southern, have adopted a resolution to retire the bonded seven per cent. debt of \$400,000, maturing Jan. 1, and to replace it with a 5 per cent. reissue.

**Kanawha.**—It is expected to have the nine-mile extension now being built from Fairfields, W. Va., to coal mines completed by Jan. 1 next. About two miles are now graded, and work is progressing rapidly. C. D. Linghamore, of Richmond, is the contractor.

**Kansas City, Fort Scott & Memphis.**—It is stated that right of way is being secured for a branch from Greenfield, Mo., through Dade and Lawrence counties to Mt. Vernon and Aurora on the St. Louis & San Francisco.

**Kennebec Central.**—Sealed proposals for grading and masonry on this road between Randolph and Togus, Me., a distance of five miles, will be received until Oct. 3, by E. D. Haley, Chairman, Gardiner, Me. Plans may be seen at the office of the Chief Engineer, Frederic Danforth, 201 Water Street, Gardiner.

**Lehigh Valley.**—The Philadelphia *Public Ledger* states that the company have sold to Brown Brothers & Co. a further amount of \$3,000,000 of the Pennsylvania & New York Canal and Railroad Co. consolidated mortgage registered bonds, due 1939. These bonds are guaranteed, principal and interest, by the Lehigh Valley. This present issue of \$3,000,000 will bear interest at the rate of four per cent instead of five per cent., and is all the company can issue prior to the maturity of the \$3,000,000 Pennsylvania & New York Canal and Railroad seven per cent. bonds outstanding in 1896 and one-half in 1906. The total issue now made of this new loan is \$7,000,000.

**Little Rock & Alexandria.**—A dispatch states that work was begun at Wrightsville, Ark., on the St. Louis, Iron Mountain & Southern last week. The road will open up a country rich in timber and agricultural products. It is to extend from Little Rock. S. M. Markle, of St. Joseph, Mo., is President.

**Los Angeles & Pacific.**—The road has been placed in the hands of W. S. Spilman, as Receiver, by order of the Superior Court at Los Angeles, Cal., on an order asked for by the Bank of California. The bank holds claims against the concern for over \$12,000. The company has spent about \$350,000, and the road is not paying interest on the investment. The track extends from Los Angeles to Santa Monica, and there is a branch to Burbank.

**Louisville & Nashville.**—It is rumored that the company intends to build a line from Springfield, Tenn., to a connection with the Owensboro & Nashville, at Adairsville, Ky., but no surveys have yet been made for the line, nor will anything be done before the annual meeting, which takes place early next month.

**Louisville, New Albany & Chicago.**—Traffic Manager W. H. McDowell, in an interview reported as saying that engineers are now locating a line from Salem, Ind., 25 miles north of New Albany, to Freeman, Jackson County, and thence north to Indianapolis.

**Louisville, New Orleans & Texas.**—The Helena Incline is progressing rapidly. The approach on the Arkansas side, from the Arkansas Midland station, where connections are made with the Arkansas Midland road and the St. Louis, Iron Mountain & Southern to the Incline, 4,000 ft., is nearly completed. J. C. Stansell, of Helena, is the contractor. Storer & Shippy, of Memphis, Tenn., are contractors for the approach on the Mississippi side, which extends from Glendale, the terminus of the Helena branch, to Trotter's Point, two miles north. The Linehan Transfer Co. has the contract for the Incline proper. The transfer boat is already on the grounds, and it is expected to be in operation in 60 days.

**Louisville Southern.**—The report recently circulated that the company proposed to build immediately to Bates Creek, Ky., and also to Lancaster, Ky., has no foundation in fact. The company has no intention of building to these points.

**Memphis, Little Rock & Indian Territory.**—A dispatch from Little Rock, Ark., states that the camping outfit and working tools of the surveying party of the road were sold under execution and attachment Sept. 26. The company announced that it would build immediately from Little Rock to Hot Springs, Ark., and the survey was commenced by a full party of engineers and continued till pay day.

**Mexican Roads.**—The Minister of Public Works has granted a concession to Gen. Pedro Martinez and Herminigildo Dávila for constructing a road to start from the city of Matamoras, state of Tamaulipas, and terminate at Matamala, state of San Luis Potosí, the latter town on the line of the Mexican National. The road is to touch the towns of Linares and Iturbide. Work must begin within a year, and the entire line is to be completed in twelve years. A subsidy of \$8,000, in 6 per cent. bonds, will be paid on each kilometre built. After 99 years, the Government has the right to buy in the property.

A concession has been granted to José María Velázquez for a railroad from the city of Tlalnepantla, on the main line of the Mexican Central, to Atizapan, with the right to extend the line to Carbon. Work is to begin within a year, and the road is to be completed from Tlalnepantla to Atizapan in three years. A subsidy of \$6,000 in 6 per cent. bonds will be given per kilometre constructed.

**Mexican Southern.**—Hampson & Stanhope, of the City of Mexico, have been awarded a large sub-contract by Read & Campbell for building that section of this road between Puebla and Tehuacan, 125 kilometres.

**Midland Transit.**—Under this name a company has been incorporated in Florida by W. J. Winegar and R. W. Davis of Alachua, Fla., to build a road from Rochelle to Melrose, Fla.

**Missouri Pacific.**—It is announced that the company is about to begin work upon a line from Fort Scott, Kan., to Bagnell, Mo.

**Mobile & Ohio.**—It is stated that the company will have a survey made immediately for an extension from Millstadt to Smithton, Ill., seven miles south of Belleville, which the residents of Smithton have asked the company to build.

President Clarke is reported as saying, when on a recent inspection of the property, that the company contemplated the purchase of the Tombigbee railroad franchise and an extension of the Artesia, Miss., branch from Columbus, Miss., to the North Alabama mining region.

**Montana & Canada.**—It is announced that a number of Helena, Mont., capitalists have completed arrangements with Sir A. T. Galt, of Canada, for the building of the Montana & Canada road, to run from Helena to Lethbridge, N. W. T., via Great Falls and Fort Benton. Work will be commenced at once and the road will be finished from Lethbridge to Fort Benton before spring.

**Nashville & Northern.**—This company was organized in August at Nashville, Tenn., to build a road from that city north for a distance of 60 miles to a point at or near Princeton, Ky., where it was proposed to connect with a

projected branch of the Ohio Valley road. This latter company has now made a proposition to build the road if the company secures subscriptions amounting to \$450,000 to its capital stock, \$200,000 from Nashville, \$50,000 from West Nashville and \$30,000 from Davidson County; \$35,000 from Cheatham County and \$135,000 from the city of Clarksville and Montgomery County. One-fourth of the subscription will be required when the road is completed and in operation to Nashville, and the balance in 6, 12 and 18 months. The work of construction is to begin at Nashville within 90 days after the subscriptions have been obtained.

**New Westminster & Southern.**—This line is being built from New Westminster, British Columbia, to connect with the Bellingham Bay road at the international boundary line, and when completed will form part of the Fairhaven & Southern road. Contractor Leary has 230 men on the work between the Yale crossing and the Nicomekl. The grading is all completed from Brownsdale to a point a little south of Parson's Channel, a distance of 11 miles. A heavy cut was encountered there, and work was resumed beyond the cut, and 3½ miles have been completed beyond that point. Six thousand cubic yards of earth must be removed in the heavy cut referred to. Work on the continuation of this line south of the boundary line is also being pushed along, and it is expected that the last rail will be laid in May next. The steel rails are now being loaded in England, to be delivered by Feb. 1, 1890. The rails for the British portion of the road will be shipped direct to New Westminster, B. C.

**New York, New Haven & Hartford.**—The directors have announced that of the new issue of stock \$3,100,000 would be issued at once, the stockholders being entitled to have one share in every five taken by them at par. The proceeds of the sale of the stock will be devoted to the improvement of the road.

**Norfolk Southern.**—Conrad N. Jordan and Henry W. Ford, trustees under the first mortgage of the company, filed a bill last week in the Circuit Court of the United States, in Norfolk, Va., for the foreclosure of the first mortgage.

**Norfolk & Western.**—Track is now laid to Swords Creek Station on the Clinch Valley Division of this road, 49 miles west from Graham Junction. Passenger trains still run only to Tazewell, Va., 19 miles, but it is expected that regular train service will be inaugurated to Swords Creek by Oct. 15. The contractors, McMahon, Green & Son, Staunton, Va., who had two miles at the mouth of Thompson's Creek, have completed their work. McGrann & Stewart, of Lancaster, Pa., who have 22 miles, have finished all but one mile, which includes the large summit cut at Ball's divide near Honaker. They expect to complete their entire contract by Oct. 1.

**Northern Maine.**—The Maine Central is reported to have made a proposal to this company to lease the road as soon as built, paying four per cent. interest on a valuation of \$20,000 per mile, the lease to run for 99 years. The road is projected to run from Mattawamkeag to Fresque Isle, Me., 114 miles. Geo. B. Wescott, of Portland, is President, and Frederic Danforth, of Gardiner, Me., is Chief Engineer.

**Northern Pacific.**—The company advertises that it will use for retiring first, second and third mortgage bonds \$81,202,000 of the new issue of \$160,000,000 gold bonds to run 100 years at not over 5 per cent. interest. Branch line bonds will take \$26,000,000. Purchase, lease or construction of tributary roads will take \$13,000,000 at not over \$30,000 per mile. For terminals, stations, rolling stock, betterments, and for surplus earnings due the preferred stock for premiums on first lien bonds, etc., \$34,798,000. Holders of the preferred can subscribe for the new bonds at 85 for 15 per cent. of their holdings, and the common can do the same. This will take \$12,925,800 of the bonds. These bonds bear 5 per cent. The preferred stock will get \$2,844,000 of the bonds, or about 8 per cent., this being set aside as a reserve dividend fund. A one per cent. cash dividend will be paid Jan. 1, 1890, on the preferred stock, and after that one per cent. quarterly.

Work is progressing rapidly upon the new lines now under construction. The most important of these is the Butte line and the Little Falls cut-off. The completion of these will shorten the Northern Pacific's line to Butte, 132 miles, and make its mileage from St. Paul 120 miles less than that of the St. Paul, Minneapolis & Manitoba. The Little Falls cut-off will be completed by Oct. 1. On the Butte line 33 miles of track has been laid, and the remaining 37 is well under way. The line will be ready for operation the first of the year. The contractors have also laid 12 miles of the track upon the Central Washington road from Davenport west to Elmira.

**Ohio & Big Sandy.**—This company, which is a reorganization of the Chataro Railroad Co., is reported to have let contracts to a firm of Louisville contractors for building the first part of the proposed extension from Richardson, Ky., to Pocahontas, Va. It is also stated that the firm will put 1,000 men at work in a few weeks. Richardson is the present terminus of the road and Pocahontas is on the Norfolk & Western, the distance between the two points being about 135 miles. The surveys have been made and follow the valley of the Big Sandy and across the Cumberland Mountains by the Breaks of the Sandy.

Justice Bartlett, in the Supreme Court, Brooklyn, has given a decision continuing the injunction obtained by J. J. White restraining G. C. Wood and others from transferring the franchise and property of the Chataro Railroad of Kentucky, to any other corporation than the Ohio & Big Sandy Railroad Co. The transfer to the latter company is to be made only on condition that the full issue of the stock, amounting to \$2,000,000, be distributed among the sinking fund and gold mortgage bonds of the Chataro Company. The persons named are also restrained from receiving \$56,000 or any other sum for any of the property held under the foreclosure. The trustees of the bondholders when the road was sold formed the Ohio & Big Sandy with \$2,000,000 capital stock, and instead of distributing it among the old stockholders the trustees, as alleged, agreed to secure a majority of the stock for C. P. Huntington at 50 per cent. of its par value. Mr. White says this was done for the purpose of depreciating the stock and forcing him and others to sell out at a low figure.

**Ohio & Mississippi.**—A suit will soon be brought before the United States Court, in which the stockholders of this road will ask for an injunction to prevent the carrying out of a plan adopted by a meeting of common and preferred shareholders in London, on June 17, 1889, under which the preferred shareholders expect to receive a four per cent. bond for \$1,000 for each \$1,000 of stock surrendered, and also \$1,000 of common stock. This corporation has issued \$20,000,000 of common and \$4,000,000 preferred stock, the majority of which is in English hands. The road was reorganized in 1867, and from that time until 1875 paid 7 per cent. upon the preferred stock, making a total for the eight years of \$2,240,000. This amount, the contesting minority will claim, was not paid out of the earnings of the property but with borrowed money. The English holders of the preferred stock have set up a claim that the dividends upon their holdings are cumulative, but in lieu of the full amount of the

